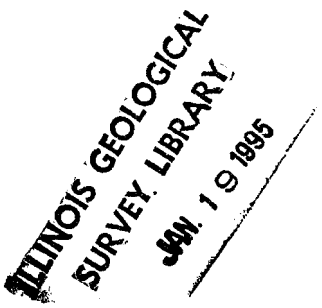
REVIEW OF THE CITY OF LAKE FOREST FINAL REPORT FOR THE 1993 BEACH AND NEARSHORE MONITORING PROGRAM AT FOREST PARK BEACH, LAKE FOREST, ILLINOIS

By

Michael J. Chrzastowski
and
C. Brian Trask



Illinois State Geological Survey
Lakes, Streams, and Wetlands Unit
615 East Peabody Drive
Champaign, Illinois 61820-6964

June 1994

Submitted to:

Illinois Department of Transportation
Division of Water Resources
3215 Executive Park Drive
Springfield, Illinois 62794-9484

Final Report For IDOT Project No.: WR-09118/SRA-190

Illinois State Geological Survey
Open File Series 1994-3

EXECUTIVE SUMMARY

Monitoring of beach and nearshore morphology at Forest Park Beach, Lake Forest, Illinois in the summer of 1993 was conducted as part of the third year in a planned five-year monitoring program. The responsibility of annually collecting and presenting survey data for five years rests with the City of Lake Forest. The Illinois State Geological Survey (ISGS) independently collects and summarizes data to provide a check on the work by the City and to provide supplemental data and interpretation. The ISGS participation in this coastal monitoring program is partially supported under a contractual agreement with the Illinois Department of Transportation (IDOT) Division of Water Resources (DWR).

During the 1993 coastal monitoring, the ISGS collected profile data in June corresponding to the time of profiling by the City of Lake Forest. A total of 27 profiles were run comprising the 15 long lines of the approved monitoring plan, four lines added at the discretion of the ISGS for additional areal coverage, and eight beach-cell lines comprising two lines in each of four beach cells. Comparison of the ISGS profile data with the data collected by the City of Lake Forest verifies the reproducibility of the profile data.

The City reports that in July a total of 3,729.55 cubic yards (cu yds) of nourishment sand and gravel was dumped into the nearshore on the south end of Forest Park Beach. ISGS personnel monitored one day of the five-day nourishment operation. This was the third and final year of meeting a requirement to provide a three-year total of 10,000 cu yds of nourishment. The City is required to nourish with a "coarse sand" according to the Unified Soil Classification (USC). Samples of the nourishment sediment collected and analyzed by ISGS confirm the size-analysis data reported by the City and verify that the material meets the requirement as a USC coarse sand. Summation of the three years of nourishment volumes reported by the City indicate that a total of 99.4% of the required 10,000 cu yds was delivered.

Comparison of 1992 and 1993 topographic and bathymetric data indicate that erosion and accretion occurred in a patchy distribution generally concentrated within the northern two thirds of the monitoring area. The maximum thickness changes for both accretion and erosion ranged from 3 to 4 ft. Maximum thickness of accretion occurred straddling the shoreline in the southern part of Beach Cell 4; maximum thickness of erosion occurred in the shallow nearshore in the southern part of Beach Cell 1.

A volumetric analysis of 1992 to 1993 beach and lake-bottom accretion and erosion was done by the ISGS and a consultant for the City (W. F. Baird & Assoc. Ltd.) based on a computer-assisted comparison of bathymetric data from these two years. Some differences occur in the two analyses because of factors such as slightly different areal boundaries for the calculations. In general, however, very good agreement was achieved, and thus the volumes reported by the City's consultant are considered a reasonable representation of net volumetric changes in the monitoring area between 1992 and 1993. For changes landward of the sand/clay interface (approximately the 15-ft contour), the two analyses agree on a 1992-93 net change of approximately 4,000 cu yds accretion (+3,800 cu yds ISGS; +4,100 cu yds City). This volumetric

change ignores the area where the City does not collect data lakeward of Breakwater I and lakeward of the southern revetment. For this area, ISGS data indicate that in 1992-93 net erosion occurred (5,000 cu yds). Thus for the entire monitoring area, ISGS data indicate the 1992-93 net change was approximately 1,200 cu yds erosion.

Accretion patterns, lake-bottom morphology, and location of the sand/clay interface are various indicators that an accumulation of sand continues to form on the lakeward margin of the project. This accretion is part of a process of building an accretionary wedge or "sand bridge" for natural bypass of littoral sediment around the facility. This accretionary wedge is essentially a southward (downdrift) continuation of the bar that has been present on the updrift end of the facility since the early post-construction history. As of the 1993 survey, the downdrift leading edge of this accretion was located opposite Breakwater III. Considering the shallower part of this accretionary wedge (*i.e.*, overlying water depths of 10 feet or less), some southward advance occurred between 1992 and 1993, but this was minor. Much of the 1992-93 accretion was at greater depth infilling an area of depression on the lake floor with depths of 12 to 14 feet. This area of depression is opposite Beach Cell 4 and Breakwaters I and II. The required infilling is slowing the southward advance of this accretionary wedge.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

This report is the third in a series of five annual reports to be prepared by the Illinois State Geological Survey (ISGS) concerning annual monitoring of beach and nearshore morphology at Forest Park Beach on the shore of Lake Michigan at Lake Forest, Illinois (Fig. 1).

Forest Park Beach is a lakeshore park and beach facility built by the City of Lake Forest. Construction was completed in 1987. This 22-acre (8.9-hectare) facility consists of rubble-mound breakwaters, beach cells, a boat-launch basin, parking, walkways, beach houses, and park land (Fig. 2). Forest Park Beach was constructed primarily to provide shore defense and to stabilize the city's lakeshore park land, and secondarily to provide lakeshore recreation (Anglin *et al.*, 1987).

Permits for construction of Forest Park Beach were issued by the Illinois Department of Transportation (IDOT) Division of Water Resources (DWR) and by the U.S. Army Corps of Engineers Chicago District. These permits required that, following completion of construction, a three-year annual monitoring program be conducted to document any changes to the beach and nearshore caused by the project. Of primary concern was the potential entrapment of littoral sediment against the north (updrift) side of the project and the resulting deprivation of littoral sediment leading to possible erosion along the shore to the south (downdrift) of the project.

One of the recommendations presented in the summary report for the three-year monitoring program was to continue the monitoring for another five years (Lake Forest Shoreline Monitoring Committee, 1990a). As part of this new monitoring program, IDOT-DWR contracted with ISGS to evaluate the data collection and gather independent data for comparison and validation of that collected by the City of Lake Forest or its consultants. All requirements for the annual monitoring were defined by the U.S. Army Corps of Engineers Chicago District.

The first year of this new annual monitoring program was 1991. Monitoring data were collected for the City of Lake Forest by a survey team from the Bellevue, Washington, offices of the consulting firm CH2M HILL. The technical report for the 1991 monitoring (CH2M HILL, 1992) was reviewed and the data collection validated by the ISGS (Chrzastowski and Trask, 1992).

The second-year (1992) monitoring differed from the first year in that the City of Lake Forest did the majority of data collection and data processing for the annual monitoring. The engineering firm Manhard Consulting, Ltd., of Vernon Hills, Illinois, was contracted by the City of Lake Forest to establish all horizontal control and collect data on offshore positioning. The firm Hydrographic Survey, Inc., of Chicago, Illinois, was contracted to provide diver-obtained data on the location of the sand/clay interface within the limits of the monitoring project and to determine if any lake-bottom erosion had occurred at 12 reference stakes set in 1991. In addition, the city contracted the firm of W. F. Baird & Associates, Ltd. of Madison, Wisconsin to

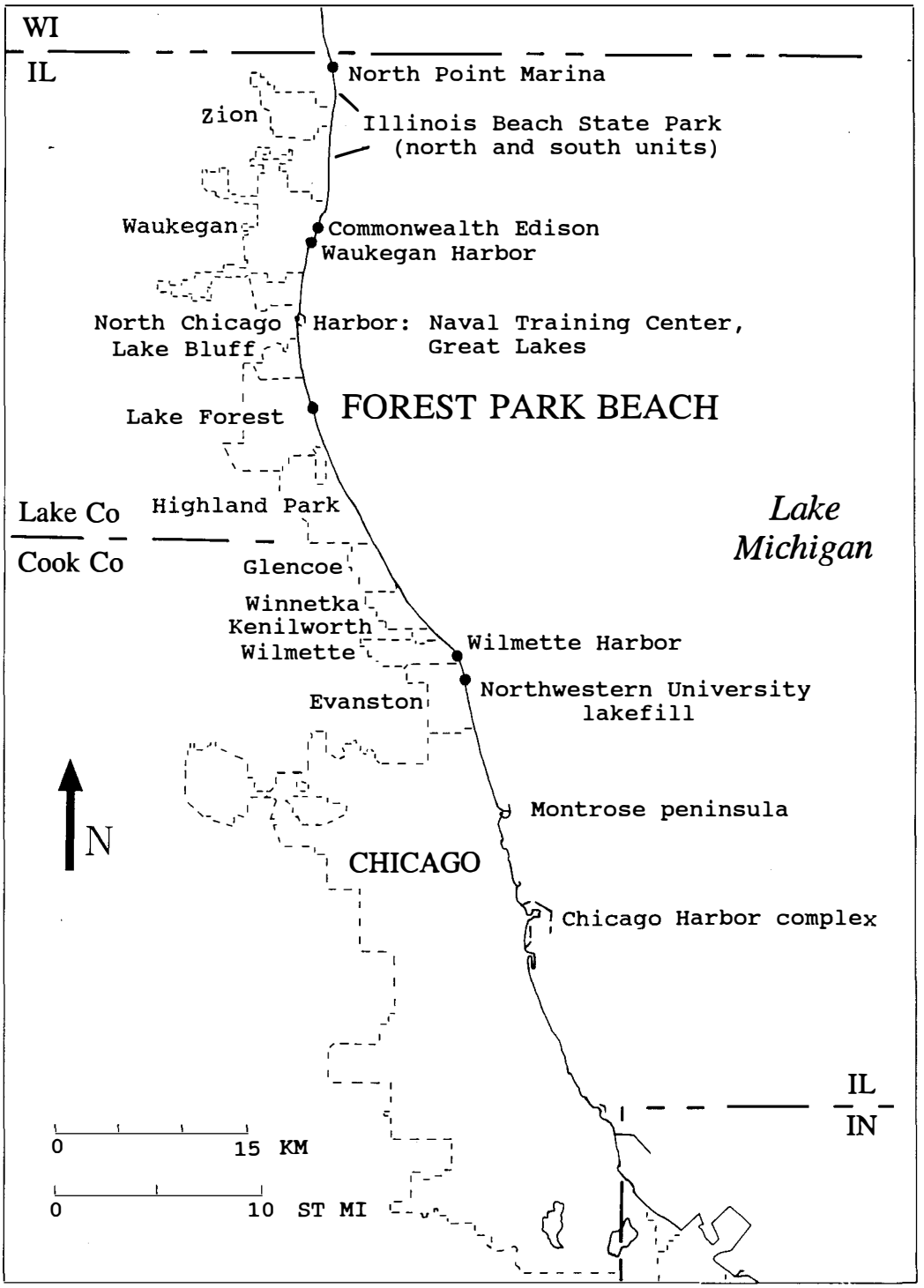


Figure 1. Map of the Illinois shore of Lake Michigan showing the location of Forest Park Beach and other major engineered structures along the northern Illinois Coast.

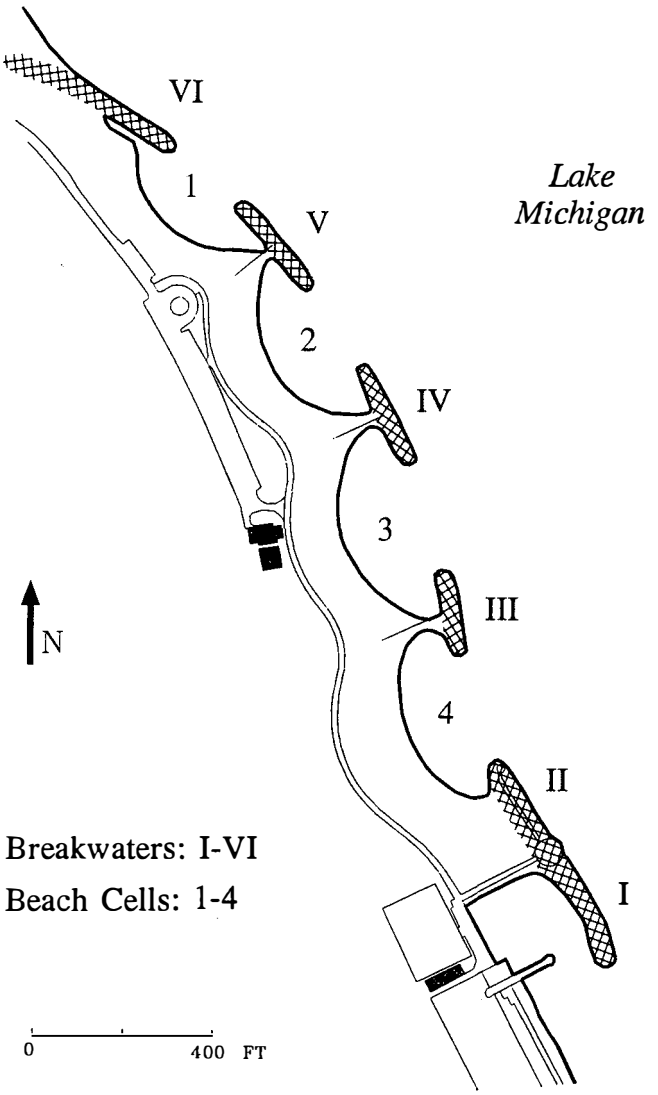


Figure 2. Numerical designation used for the six breakwaters (Roman numerals; south to north) and the four beach cells (Arabic numerals; north to south) at Forest Park Beach.

perform a volumetric analysis of beach and nearshore accretion and erosion using data from 1992, 1991, and 1988. The volumetric analysis was done at the request of the U.S Army Corps of Engineers Chicago District. The report summarizing the 1992 annual monitoring by the City of Lake Forest was completed by the city in March 1993 (Magnus, 1993a). A supplement to the city's final report summarizing the volumetric analysis was completed in August 1993 (Baird & Associates, 1993a). These two technical reports for the 1992 monitoring were reviewed and reported on by the ISGS (Trask and Chrzastowski, 1993b).

The third-year (1993) monitoring at Forest Park Beach was conducted as the second year with the City of Lake Forest primarily doing the data collection and processing with assistance from the engineering firms of Manhard Consulting, Ltd., Hydrographic Survey, Inc., and W. F. Baird & Associates, Ltd.

The third-year report prepared by the City of Lake Forest (Magnus, 1993b) and the accompanying volumetric analysis prepared for the city by W. F. Baird & Associates are the subject of review in this report.

UNITS OF MEASURE

Both U.S. Customary (*i.e.*, English) and metric units are used in this report. Primary reference is to U.S. Customary units, with metric equivalents given in parentheses. Abbreviations for units are used throughout the text. Table 1 gives the various units of measure and the abbreviations used in this report.

Table 1. Abbreviations for U.S. Customary and metric units.

UNIT	ABBREVIATION
foot	ft
cubic yard	cu yd
mile	mi
millimeter	mm
meter	m
kilometer	km
cubic meter	cu m

PURPOSE AND SCOPE

The role of the ISGS in the coastal monitoring program at Forest Park Beach is that of a scientific and technical reviewer of the City of Lake Forest data collection, data processing, and data reporting in order to provide quality assurance and quality control. As part of this role as a scientific and technical reviewer, the ISGS is responsible for

independently collecting monitoring data and making field observations within the monitoring area at Forest Park Beach for comparison with and checking of the data collected by the City of Lake Forest and its consultants.

For the Forest Park Beach monitoring program, the ISGS is under contractual obligation to IDOT-DWR, the state agency responsible for regulatory functions along the nearshore and offshore zone of the Illinois coast of Lake Michigan. As part of its program to assure proper coastal management and mitigation, IDOT-DWR has specific interest in the quality assurance and quality control of the Forest Park Beach monitoring program.

The scope of work for the ISGS has essentially been the same for each of the first three years of this five-year program. The specific scope for 1993 was as follows:

- Observe and document the 1993 data collection by the City of Lake Forest and independently repeat selected profile lines for data comparison.

- Review the adequacy of the annual report prepared by the City of Lake Forest for the 1993 monitoring and summarize this review in a report to IDOT-DWR.

- Collect profile data along all 15 of the so-called "long-profile lines," which are profile lines extending to approximately 2000 ft (800 m) offshore as outlined in the initial monitoring requirements for this five-year monitoring program.

- Incorporate and archive all data collected by the ISGS into the existing ISGS database on coastal geology and geomorphology for the Illinois coast of Lake Michigan.

Two aspects of this report for the 1993 coastal monitoring are worth noting:

1) This report by the ISGS for the 1993 coastal monitoring includes fewer maps and map comparisons than the preceding ISGS report for the 1992 coastal monitoring (Trask and Chrzastowski, 1993). The preceding report included numerous maps of bathymetry and lake-bottom changes many of which were derived from data collected by consultants for the City of Lake Forest in the early monitoring at Forest Park Beach prior to the present monitoring program that began in 1991. These maps were presented in the ISGS report for the 1992 monitoring at the request of the U.S. Army Corps of Engineers Chicago District to allow an "interim" analysis of lake-bottom changes and volumetric changes for 1988 through 1992. Such long-term comparisons will be done again in the report for the 1995 monitoring which will be the final year of the ongoing five-year monitoring program.

2) In 1992 the City of Lake Forest established a rigorous data-collection scheme using a total station and prism pole for all data points in the area monitored by the city. In the previous year (1991), the first year of this monitoring program, these data were collected by a consultant for the City using a combination of prism-pole measurements and a boat-mounted fathometer. In addition, the City's lakeward extent of surveying was less extensive in 1991. Thus for making lake-bottom comparisons, the 1993 report is the first year in the new five-year monitoring program that compares data sets by the City of Lake Forest (*i.e.*, comparison of 1992 and 1993) that were collected by the same equipment, same procedures, and same area of coverage.

PART 1: DATA COLLECTION AND PRESENTATION

ISGS FIELD PROCEDURES

Fathometer Survey Procedures

Note: Use of specific product names in this report is for informational purposes only and does not constitute endorsement by the Illinois State Geological Survey.

Lake-bottom profiling by fathometer was conducted in the same manner as that done by the ISGS during the 1991 and 1992 monitoring. In addition, the same ISGS equipment was used as in 1991 and 1992. Reduced photocopies of the 1993 fathometer traces are located in APPENDIX A.

Collection of fathometer data involved a three-person team, with two persons in a survey boat and one person onshore. The boat was a 12.5-ft (3.8 m) "Zodiac-type" inflatable with a 9.9-horsepower outboard motor. The onboard fathometer was a Ross Model 803 Portable Survey Fathometer with a 100 kiloHertz (kHz) transducer. The transducer was mounted over the port side of the boat with a 0.5-ft (0.15-m) transducer depth. Transducer depth is not a factor in reading the fathometer traces, because the Ross Model 803 fathometer has an adjustment that allows compensating for this depth. At the beginning of each survey day, calibration of the fathometer was verified with a bar check by lowering a steel grate below the transducer and producing a fathometer record at one-foot intervals from 2 to 12 ft (0.6 to 3.65 m); calibration was also verified by comparison with depths obtained by lowering a stadia rod to the lake floor and noting the level of the lake surface on the rod.

Position control for the fathometer surveys was by a range/azimuth technique. The onshore field assistant used a surveyor's transit positioned over the control point for the profile line that had been surveyed and marked by the City of Lake Forest's consultant (Fig. 3). The transit was oriented along the azimuth of the profile line. As the survey boat advanced toward shore, the transit operator gave radio calls or visual signals to the boat operator to keep the boat within one boat width (5.6 ft; 1.7 m) of the profile line (*i.e.*, the transit center line). Approximate boat speed during profiling ranged from two to three knots (3 to 5 ft/sec).

Offshore distance to the survey boat was measured using a Motorola Mini-Ranger III system. The Mini-Ranger measures distance in meters by travel time of a microwave signal between a transceiver and transponder. The transceiver and console were aboard the survey boat; the transponder was onshore, placed at a known location on the profile line, usually beneath the transit at the profile control point. The fathometer operator monitored the digital display of distance on the Mini-Ranger console, and made an event mark on the fathometer trace at every 10-m (32.8-ft) interval. For reference, at every 50-m (164-ft) interval a bolder mark was made by slightly longer depression of the event button. Profile start time was noted to permit water-level corrections during data processing. Profiles began offshore at a distance of 800 to

FOREST PART BEACH
LAKE FOREST, ILLINOIS
Survey Control Net

1. Brass cap in island.
   8,000 N
   2,000 E
   100 ft elev

2. Concrete nail in walk.
   7,532.79 N
   2,040.17 E
   98.39 ft elev

3. Brass cap on hill.
   7,124.16 N
   1,856.39 E
   108.15 ft elev

4. Concrete nail by dock.
   6,524.89 N
   1,980.31 E
   98.63 ft elev

5. Brass cap at sewer building.
   5,617.29 N
   2,000 E
   100.11 ft elev

6. Brass cap by flags.
   6,536.61 N
   2,216.15 E
   99.93 ft elev

7. 5,587.466 N
   1,998.631 E

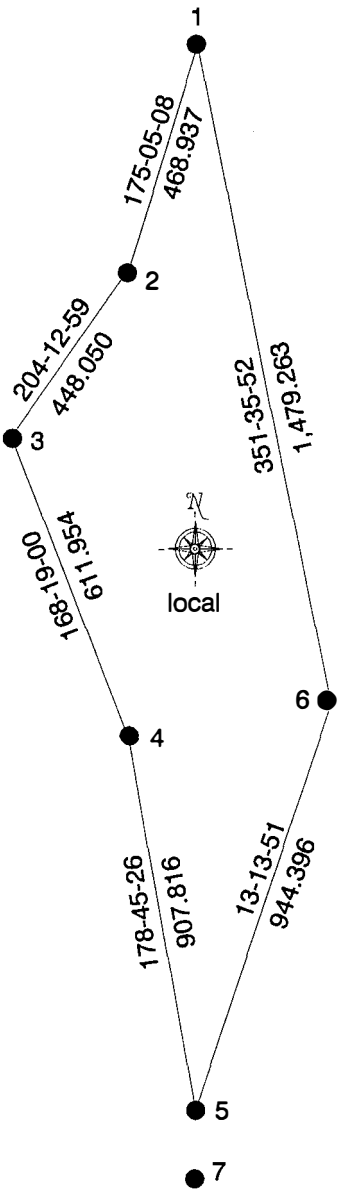


Figure 3. Survey control points used to establish profile locations and azimuths during the 1993 monitoring. This survey grid was first established for the 1991 monitoring and has been used in each successive year.

900 m (2625 to 2950 ft) and continued toward shore to a water depth of about 2 ft. In order to acquire a continuous onshore to offshore profile, beach and nearshore profiling with a total station and prism pole (see Prism-Pole Surveys) was done as a continuation for each of the fathometer lines and overlapped the fathometer lines for a distance of 0.5 to 106 ft (0.15 to 32.3 m). An exception occurs at some breakwaters or riprap where it was not always possible to overlap the two data-collection procedures.

The manufacturer states that the accuracy of the Mini-Ranger III system is ±3 m (±9.8 ft). The system has a maximum range of 37 km (22 mi). The Mini-Ranger used in this study was capable of operating to a minimum distance of 10 m (32.8 ft) between the transponder and transceiver.

Fathometer Survey Coverage

The 1993 fathometer surveys by the ISGS covered all of the so called "long profiles" established in 1991 by CH2M HILL for this five-year monitoring program. Fathometer data were also collected along each of two lines centered on each of the four beach cells. These fathometer profiles were collected to compare with data from the City of Lake Forest along survey lines that extend lakeward of the breakwaters. For consistency with the other fathometer profiles collected on the north and south sides of the project, these beach-cell fathometer lines were extended offshore to 800-900 m (2625-2950 ft). At the discretion of the ISGS field team, in the 1992 monitoring, four long lines were added to the survey scheme at 200-ft (61-m) line spacing northward from line N5617. These four additional lines (N5817, N6017, N6217, and N6417) were added to provide lake-bottom data lakeward of Breakwater I at the boat-launch basin and lakeward of the riprap-defended shore south of this basin. These lines were first run in 1992 and were again run in 1993.

In total, fathometer data were collected by the ISGS along 27 profile lines. Figure 4 shows the locations and designations of these fathometer profiles. On the landward end of each of the fathometer profiles there is overlap with profile data collected by wading in the nearshore with a prism pole, except at a few locations where overlap was not possible.

The City of Lake Forest surveyed a total of 66 profiles for a distance of 800 ft (244 m) lakeward of the E2000 baseline. Figure 5 shows the locations and designations of profiles run by the City of Lake Forest. Figure 6 identifies the profiles of the City of Lake Forest duplicated by the data collection of the ISGS.

Prism-Pole Surveys

Prism-pole surveys refer to profiling across the beach and into the nearshore zone by two people, one holding a prism pole and advancing in increments along the profile line, and the other shooting the position and elevation of the prism pole with a total station positioned at a bench mark in the project area to record position and elevation. The total station used by the ISGS was a Lietz/Sokkisha Set 4A with a Lietz SDR20 Electronic Field Book. All position and elevation data were recorded in the electronic

field book attached to the total station. The person with the prism pole maintained position along the profile line by the alignment of onshore stakes, cones, or flags. Elevation measurements were normally made at horizontal intervals of approximately 5 to 15 ft (1.5 to 4.6 m). Smaller intervals were used to document notable changes in relief and bottom texture; longer intervals were used in areas with relatively continuous slope. The profiling was extended offshore to about a 5-ft (1.5-m) depth to permit overlap with the fathometer data. A wet suit allowed prolonged stay in the water.

A prism-pole survey was conducted on the landward part of every long line. Thus a total of 27 prism-pole survey lines were completed. The prism-pole surveys originated at some fixed upland feature such as a curb or crest of riprap, or where possible on the bluff slope along the west side of the project. Positions and elevations were taken across any upland features (*e.g.*, riprap, beach, or breakwater stone) and were generally continued into the shallow nearshore to a maximum depth of about 5 ft (1.5 m). An exception was at the outside edges of breakwaters where, for safety reasons, prism-pole surveying ended at the farthest lakeward point (usually a face stone) that could be reached while standing on the subaerial breakwater stones. Profiles resulting from the ISGS surveys, combining both fathometer and prism-pole data, are shown in APPENDIX B.

Field Schedule

The ISGS collected 1993 beach and nearshore profile data at Forest Park Beach on June 17, 18, 19, 22, and 23 (Table 2). Fathometer data were collected on June 17, 18, and 19. Each of these days had moderated wave conditions. On June 17 there was a one- to two-foot (0.3- to 0.6-m) swell coming from the southeast. This occurred in the offshore areas, but within the beach cells the water was calm. On June 18 waves coming from the northeast were less than one foot (0.3 m) in the morning and early afternoon when the fathometer surveys were run. No fathometer work was done during the afternoon of June 18 because waves increased to over 1.5 ft (0.5 m). Fathometer surveys resumed and were completed on June 19 while lake conditions ranged from calm to waves no more than one-half foot (0.2 m).

Prism pole surveys were conducted on June 22 and 23. Although wave height was as much as one foot (0.5 m) during the surveys, the prism pole provides a direct measurement of lake-bottom elevation independent of any water-level fluctuations.

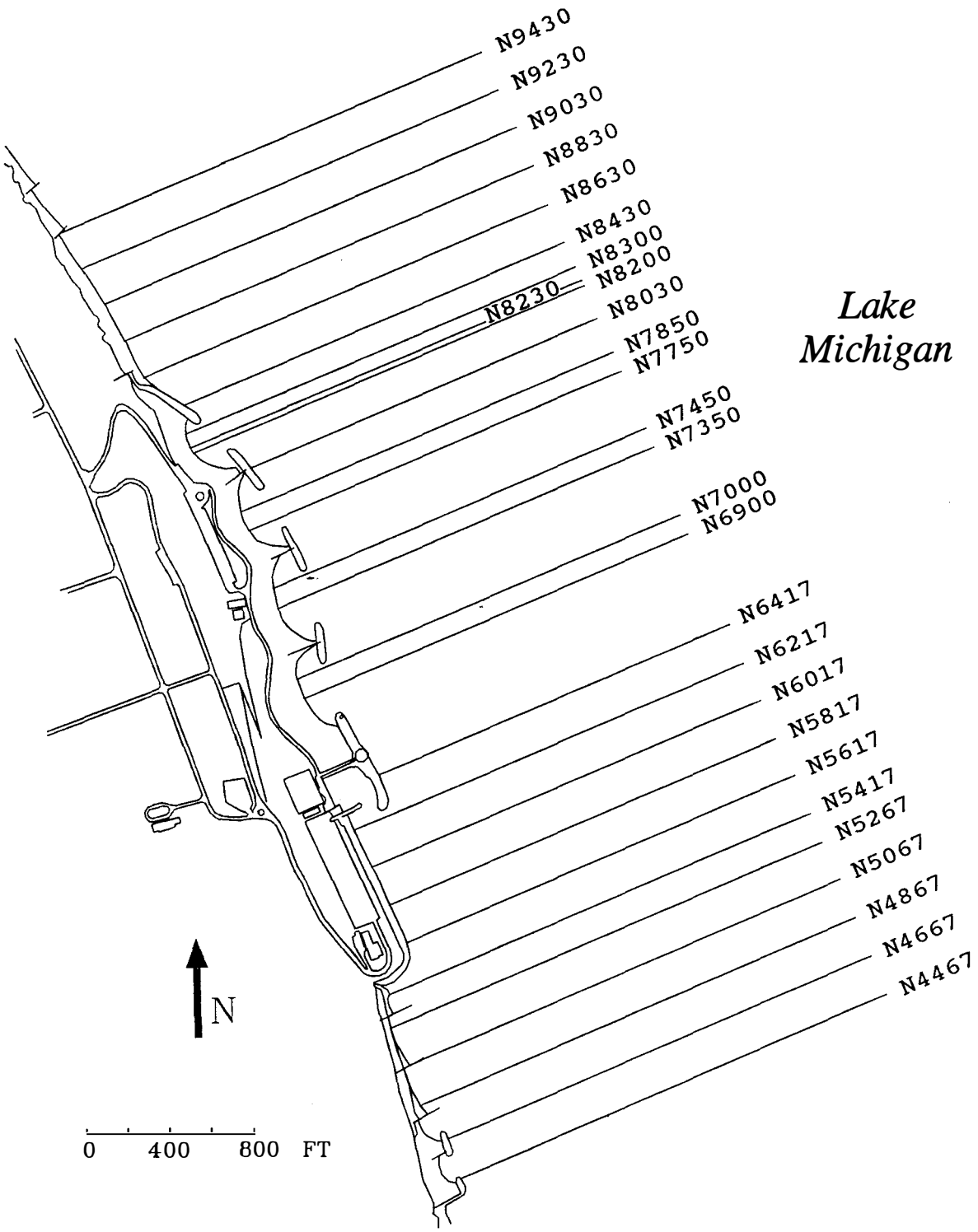


Figure 4. Location and designation of fathometer profile lines surveyed by the ISGS during June 1993.

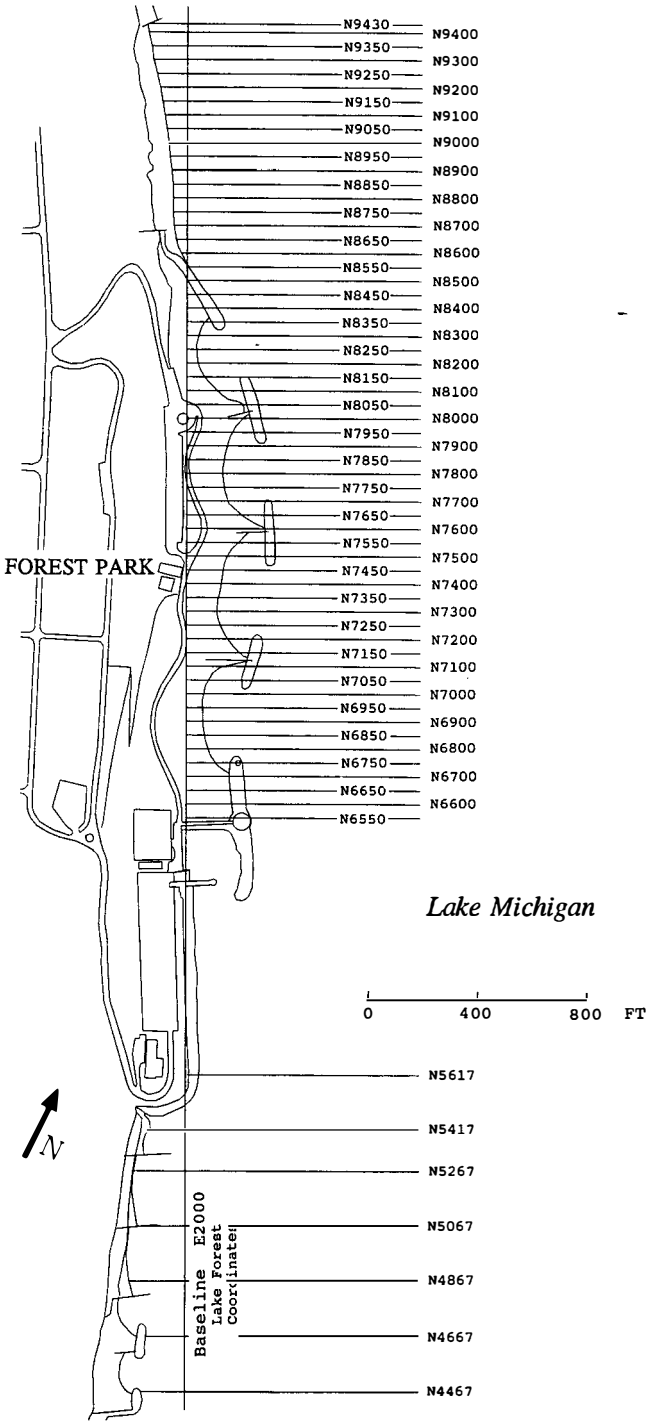


Figure 5. Location and designation of profiles surveyed by the City of Lake Forest in 1993. Profiles extended west of the baseline to some "permanent" feature such as a curb, sidewalk, riprap, or bluff slope.

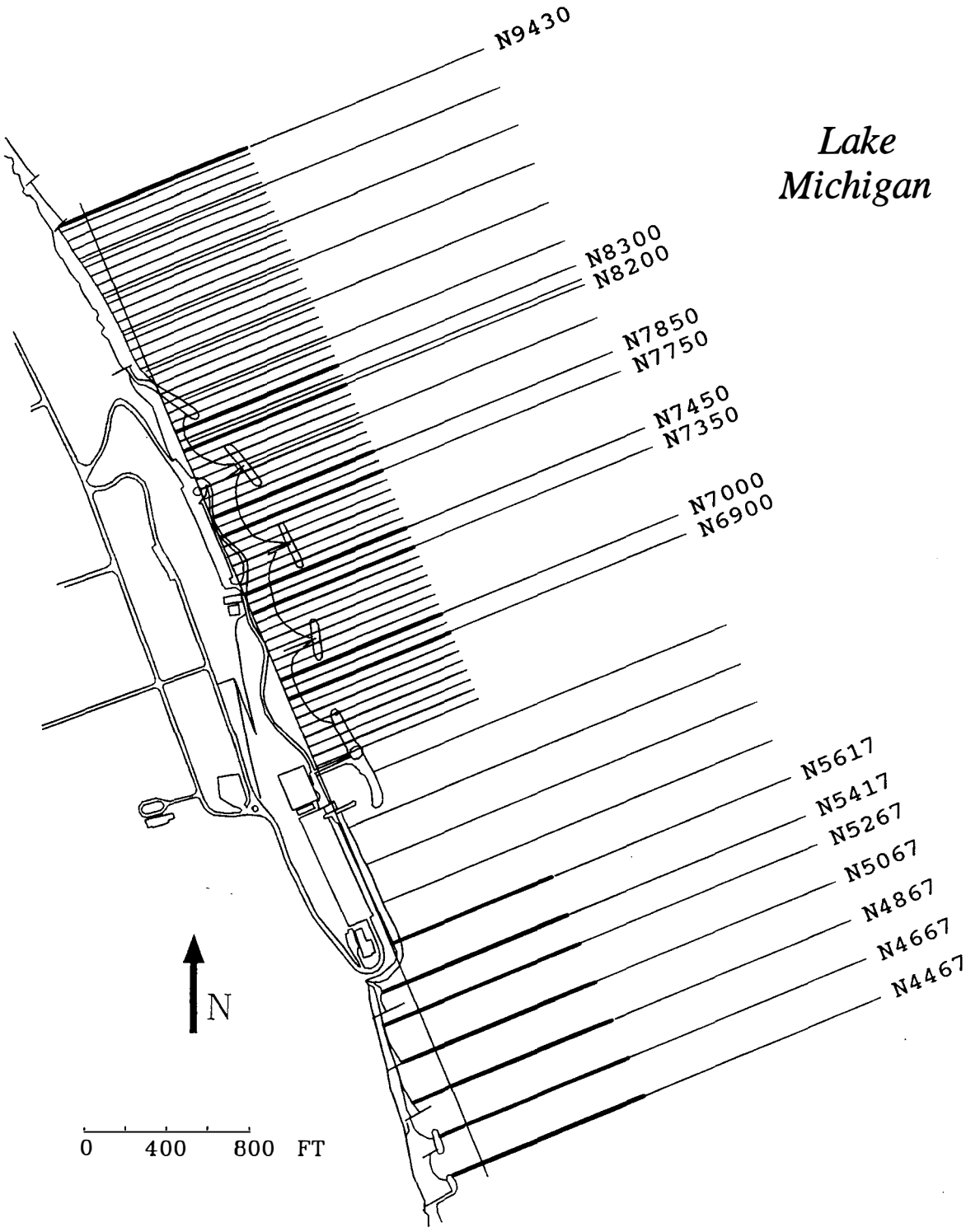


Figure 6. Location and designation of 1993 profiles surveyed by the City of Lake Forest and duplicated by the ISGS. Lines with labels indicate the 16 profiles that are duplicated in the two data sets. Bold lines indicate the extent of profile duplication.

Table 2. 1993 daily data collection by the Illinois State Geological Survey.

DATE	OPERATION	LINES SURVEYED
June 17	Fathometer survey of long lines from southern limit of monitoring area to lines intercepting Beach Cell 3.	N4467, N4667, N4867, N5067, N5267, N5417, N5617, N5817, N6017, N6217, N6417, N6900, N7000, N7350, N7450
June 18	Fathometer survey of long lines intercepting Beach Cells 1 and 2 and line intercepting northern breakwater.	N7750, N7850, N8030, N8200, N8230, N8300, N8430
June 19	Fathometer survey of long lines intercepting updrift beach.	N8630, N8830, N9030, N9230, N9430
June 22	Prism-pole survey from Beach Cell 3 to northern limit of monitoring area.	N7350, N7450, N7750, N7850, N8030, N8200, N8230, N8300, N8430, N8630, N8830, N9030, N9230, N9430
June 23	Prism-pole survey from southern limit of monitoring area to Beach Cell 4.	N4467, N4667, N4867, N5067, N5267, N5417, N5617, N5817, N6017, N6217, N6417, N6900, N7000

ISGS DATA PROCESSING

Depths on the fathometer traces were tabulated at every 5-m (16-ft) horizontal increment (thus at each sequential 10-m vertical mark and midway between these marks). Additional depth/distance points were interpolated for prominent features occurring between these 5-m (16-ft) increments. Because of the swell and wave conditions, it was necessary to draw a smooth line through the fathometer traces from which to measure the depths. Photo-reduced reproductions of these fathometer traces are included in APPENDIX A. The distances were referenced to the coordinates of the profile control point and were converted to both Illinois state plane coordinates and the local coordinates of the City of Lake Forest survey grid.

All depths from the fathometer traces were first corrected to Lakes Michigan-Huron Low Water Datum (LWD). This correction involved a depth adjustment based on the average of hourly lake levels recorded by the National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), at both Calumet Harbor, Illinois (Gauge No. 7044) and Milwaukee, Wisconsin (Gauge No. 7057). The data were subsequently adjusted to Lake Forest Datum (LFD) by subtracting 2.06 ft from the LWD depths. The profile data collected with a prism pole were measurements of lake-

bottom elevations relative to the elevation of the brass cap or concrete nail to which the total station was referenced. For these data, adjustment to LFD was done by subtracting the LFD elevation of the appropriate brass cap or chisel mark from the elevation of the surveyed points.

Tables 3, 4, and 5 show hourly Calumet Harbor and Milwaukee lake-level elevations for the fathometer survey dates in June 1993. The mean correction to LFD is the correction factor that was subtracted from the raw fathometer depth data to reduce depths to LFD. For all three dates during the hours of fathometer operations, there was excellent agreement in lake level at the Calumet and Milwaukee gauges. The overall agreement attests to a lack of any lake level set-up, seiches, or regional fluctuations along this segment of the western lakeshore at the time of the surveys.

The X-Y-Z data of position and LFD-corrected depth were plotted as profiles using the ARC/INFO Geographic Information System (GIS). The profiles were drawn to the same scale, format, and vertical exaggeration (10x) as the City of Lake Forest report to facilitate comparisons. The fathometer (long) profiles with their beach/nearshore prism-pole components are assembled in APPENDIX B.

Table 3. Lake levels in feet at Calumet Harbor, Illinois, and Milwaukee, Wisconsin, on June 17, 1993. Lake-level data from NOAA-NOS.

HRS CST	Calumet Harbor Illinois		Milwaukee, Wisconsin		Calumet/ Milwauk. Lake Level Diff.	Mean Corr. to LWD	Mean Corr. to LFD
	LWD	LFD	LWD	LFD			
0600	2.64	0.58	3.13	1.07	0.49	2.88	0.82
0700	2.41	0.35	3.00	0.94	0.59	2.70	0.64
0800	2.73	0.67	2.77	0.71	0.04	2.75	0.69
0900	3.00	0.94	2.93	0.87	0.07	2.96	0.90
1000	2.67	0.61	3.00	0.94	0.33	2.83	0.77
1100	2.90	0.84	3.06	1.00	0.16	2.98	0.92
1200	2.83	0.77	3.03	0.97	0.20	2.93	0.87
1300	3.09	1.03	3.00	0.94	0.09	3.05	0.99
1400	2.80	0.74	3.13	1.07	0.33	2.96	0.90
1500	2.54	0.48	2.67	0.61	0.13	2.60	0.54

Table 4. Lake levels in feet at Calumet Harbor, Illinois, and Milwaukee, Wisconsin, on June 18, 1993. Lake-level data from NOAA-NOS.

HRS CST	Calumet Harbor Illinois		Milwaukee, Wisconsin		Calumet/ Milwauk. Lake Level Diff.	Mean Corr. to LWD	Mean Corr. to LFD
	LWD	LFD	LWD	LFD			
1000	3.03	0.97	3.00	0.94	0.03	3.01	0.95
1100	2.64	0.58	3.00	0.94	0.36	2.82	0.76
1200	2.96	0.90	2.90	0.84	0.06	2.93	0.87
1300	2.93	0.87	2.90	0.84	0.03	2.91	0.85

Table 5. Lake levels in feet at Calumet Harbor, Illinois, and Milwaukee, Wisconsin, on June 19, 1993. Lake-level data from NOAA-NOS.

HRS CST	Calumet Harbor Illinois		Milwaukee, Wisconsin		Calumet/ Milwauk. Lake Level Diff.	Mean Corr. to LWD	Mean Corr. to LFD
	LWD	LFD	LWD	LFD			
1100	3.00	0.94	3.00	0.94	0.00	3.00	0.94
1200	2.96	0.90	2.80	0.74	0.16	2.88	0.82
1300	3.03	0.97	3.06	1.00	0.03	3.05	0.99

REVIEW OF THE CITY OF LAKE FOREST PROFILING PROCEDURES

During June 1993, the ISGS monitored the City of Lake Forest field procedures and operations. Operations monitored included the surveying to establish horizontal control points onshore along the profile lines, and the profiling across the beach, nearshore, and offshore. Profile locations were established based on the control points shown in Figure 3. The City followed all standard field procedures for such a survey. The City contracted with Manhard Consulting, Ltd. to perform the survey necessary to set up the profile lines and to operate the total station during profiling operations. This was done using accepted surveying practices.

For all the profiles surveyed by the ISGS, the ISGS independently verified the profile locations using a prism pole and total station. All X-Y-Z coordinates determined by Manhard Consulting, Ltd. for the City of Lake Forest were replicated by the ISGS.

Beach Profiling

The 1993 profiling conducted by the City of Lake Forest was done entirely with a total station and prism pole in the same way that the city collected data in 1992. The total station was set up at one of the established brass caps or chisel marks along the park property. The prism pole was moved along each of the profile lines. Data for X and Y (location) and Z (elevation) were recorded at each shot point in an electronic notebook attached to the total station. For profiling across the beach, over breakwaters, and into the water within several feet of the shoreline, a survey person carried the prism pole.

Nearshore Profiling

The 1993 nearshore profiling conducted by the City of Lake Forest involved two boats and a tether line extending from shore to the lakeward limit of surveying (Fig. 7). This line was held by an anchor at its shore end and by a boat at the lakeward end. The boat was kept at idle speed in reverse gear to hold the line taut. Onshore range markers allowed the boat operator to keep the tether line positioned along the desired profile. A second boat was yoked to the tether line and a crew member pulled this boat along the tether stopping at 20-ft (6-m) intervals premarked on the tether. At each stop a crew member of this second boat placed the foot of the prism pole on the lake bottom and signaled the total station operator to make a shot (Fig. 8). After recording the location and elevation, the total-station operator signaled the boat to move to the next shot point. Data collection could proceed with successive points being shot in either landward or lakeward direction. In order to work in water deeper than the maximum extension of a standard prism pole, the prism was mounted atop a 20-ft (6-m) long telescoping surveyor's rod.

General Statement on City of lake Forest Profiling Procedures

The profiling procedure used by the City of Lake Forest involving a prism pole moved along a profile line is one of the most accurate ways of collecting nearshore profile data. Fathometer data can provide an independent check on these data, but the prism-pole data are the preferred data because of greater accuracy in terms of location (X, Y data) and elevation (Z data). This comparison of prism pole and fathometer techniques was discussed in detail in the report prepared by the ISGS for the 1992 monitoring (Trask and Chrzastowski, 1993).

Figure 7. City of Lake Forest profiling operations. A tether line is anchored on shore along a profile line and pulled taught by a boat offshore (more distant boat in photograph). Prism-pole measurement are made from the second boat moving along the tether line. Photo date: June 23, 1993.

Figure 8. City of Lake Forest skiff with person holding prism pole for elevation measurement at 20-ft (6-m) interval marked on the tether line. Photo date: June 23, 1993.

COMPARISON OF ISGS AND CITY OF LAKE FOREST PROFILES

Sixteen of the profiles surveyed by the City of Lake Forest were also surveyed by the ISGS. Eight of these profiles are from the beach cells, and the remaining eight are the long profiles from north and south of the Forest Park Beach project.

Comparisons of profiles surveyed by the ISGS and the City of Lake Forest (APPENDIX C) in general show excellent agreement in spite of the differences in the methods of data collection. In the cases where differences occur in the profile comparisons, these differences fall into four categories discussed below.

Spurious Points

Spurious points refer to depth values that are anonymously high or low compared to adjacent points and thus inconsistent with the overall surface trend determined by nearby points. A spurious point in the City of Lake Forest data occurs in the comparison for profile N 8200 at 2450 ft local easting (APPENDIX C). The point has a depth difference of about 4 ft below the ISGS profile. The likely explanation for the difference is that a four-foot section of prism pole had been added or removed and the corresponding adjustment had not been made in recording the elevation on the total station, or a correction was made on the total station without a prism-pole adjustment. Other possible explanations for the spurious point could be that the base of the prism pole sank into the lake bottom, the total station received an inaccurate signal, or some error occurred in data processing.

No other spurious points are identified in the 16 profiles that the ISGS and City of Lake Forest had in common. However, a total of 14 additional spurious points were found in the City of Lake Forest data set when the ISGS contoured these data. These spurious points occurred as a series of successive depth values along several different profile lines. From adjacent data it was clear that the recorded depths were off by an integer value of either four (4) or eight (8) ft. (Fig. 9). A possible explanation for these errors could result from a data processing error or incorrect datum correction. W. F. Baird & Associates (1993b) noted similar errors in Lake Forest data and, after consultation with the City, deleted these points from the data set prior to volume analysis.

> ***Comment:*** The entire data set collected by City of Lake Forest contains approximately 3400 data points. Of these 3400 points, a total of 15 spurious points were identified by ISGS (1 by comparing duplicate profiles; 14 by examining a plot of all data and attempting to contour). These 15 points required correction before an accurate contour map could be produced. The occurrence of these points in the data set indicates that more careful review of the data is necessary by the City of Lake Forest or its consultants before the data are submitted as finalized.

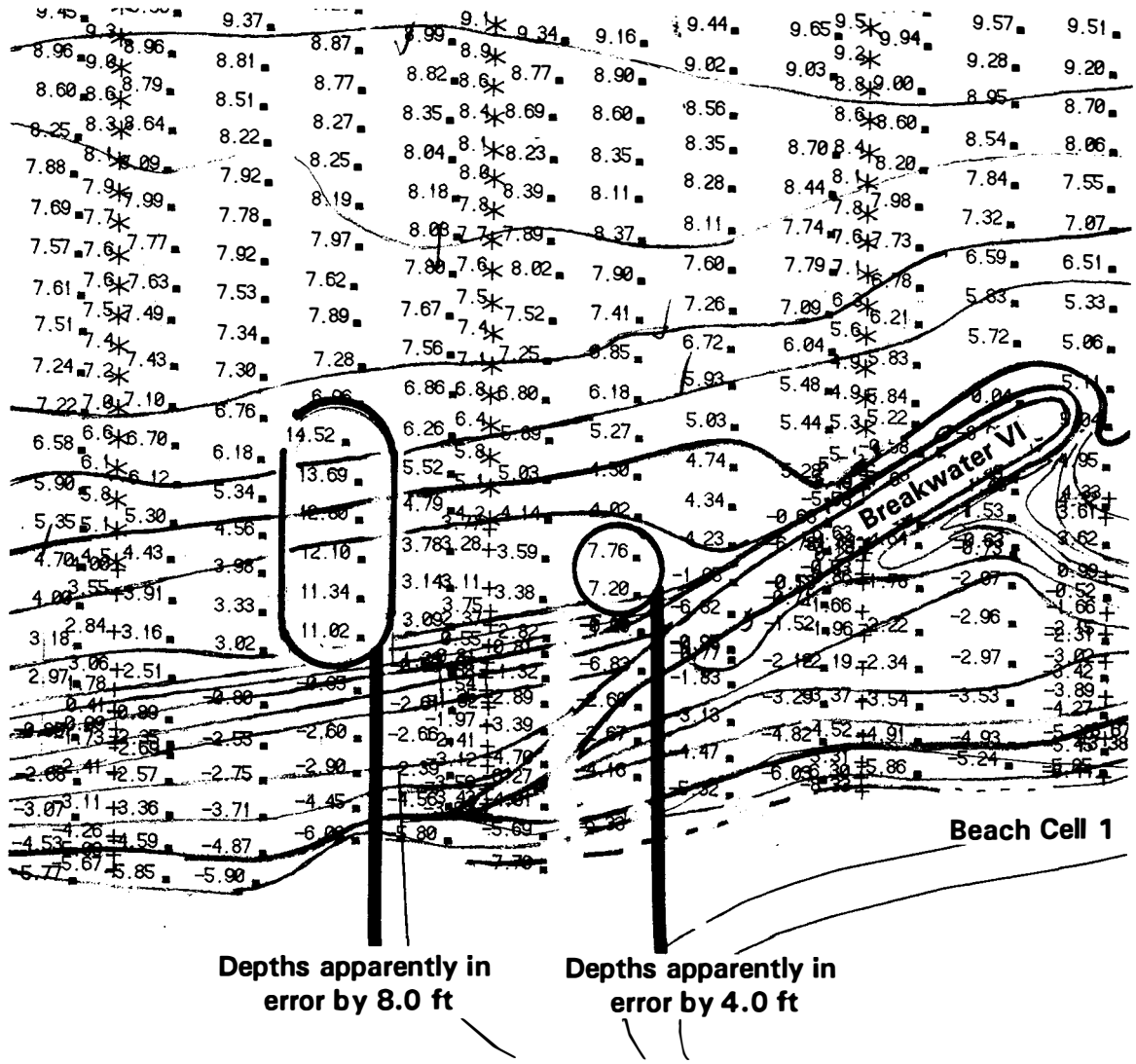


Figure 9. Example segment of a plot of City of Lake Forest nearshore data and preliminary contouring by ISGS. Spurious points were readily identified during such contouring procedures by the points being inconsistent with the overall trend of nearby contours and lake-bottom morphology.

Profile Vertical Displacement

Profile vertical displacement refers to a condition in which a segment or major part of the two profiles are symmetric with equivalent hummocks and troughs and overall shape, but with a rather uniform vertical offset, one above another. Such a vertical displacement occurs along the more lakeward half of profiles N 5617 and N 4667 (APPENDIX C). In both cases, the ISGS profile line is about 1.0 to 1.3 ft (0.3 to 0.39 m) below the City of Lake Forest profile line.

The vertical displacement suggests a systematic error in one of the data sets. The prism-pole data collected by City of Lake Forest are a direct measure of lake-bottom elevations independent of any corrections for lake level or waves. Such corrections are necessary for the fathometer data. The profile vertical displacement is interpreted as resulting from the ISGS fathometer data being adjusted by a lake-level correction that did not correctly bring the data to the Lake Forest Datum.

> ***Comment:*** Because the ISGS data fall below the City of Lake Forest data, this condition could have arisen if there was a localized and short-lived fall in lake level while these profile lines were being surveyed. This is one of the potential problems in collection of fathometer data as opposed to prism-pole measurements. The symmetry of the two data sets confirm the reproducibility of the data collection by the City of Lake Forest.

Profile Discrepancies at Revetments and Breakwaters

In comparing two sets of profile data along the same profile line, it is difficult to get agreement in profile data over the exposed parts of rubble-mound revetments and breakwaters because, unless the exact same points on the breakwater stones are surveyed, significant differences in elevation may occur. Discrepancies occur in the City of Lake Forest and ISGS data sets where profiles cross over breakwaters in profiles N4467, N4667, N5267, N5417, and N5617 (APPENDIX C). These are the most substantial discrepancies occurring in any of the profile comparisons. The discrepancies are not errors, but differences in the number and location of survey points atop the breakwater stone.

Although the profile data atop breakwaters do not apply to the concerns of sand accretion or erosion at the project, development of the best possible data set will require some additional effort by the City of Lake Forest to acquire more data points when crossing the breakwaters and riprap. The comparison for profile N5617 is an excellent example of how the ISGS profile shows that a greater number of points and more careful point selection will result in a more accurate documentation of elevation and slope across breakwaters and revetments.

Discrepancies can also occur in the below-water part of the profile near breakwaters if a submerged rock is recorded in the points of one data set but not the other. An example occurs in profile N7450 at the local easting of about 2275 ft. The high point recorded by the City of Lake Forest is apparently an elevation atop a submerged stone on the southern end of Breakwater IV.

Comment: In making annual comparisons of profile change near the breakwaters and riprap, it is important to scrutinize the data to identify if submerged breakwater stones may be included one year but not another, and to be sure that this does not result in an interpretation of lake-bottom accretion or erosion.

Summary

Discrepancies occur in some common segments of the two profile data sets collected in 1993, but these can be explained by lake-level corrections applied to the fathometer data or differences in the number and location of points across riprap or breakwater stones. In several cases spurious points were identified in the City of Lake Forest data set, but these readily stood out when plotted and compared to the surrounding data field, and thus they could be corrected prior to producing a final contour map. Greater care is needed by the City of Lake Forest or its consultants in reviewing a plot of the data to identify spurious points and to edit these from the finalized data set as was done by W. F. Baird & Associates (1993b). Data should be edited and formatted for easy perusal prior to being included in the final report (see APPENDIX F for examples).

Conclusion

Sufficient comparison data are available for us to conclude that the profile data collected in 1993 by the City of Lake Forest are reproducible. Thus except for the few problem data points discussed, the profile data are verified. These data can be used to compare with existing data from 1992, 1991, earlier surveys, and with data to be collected during the remaining two years of the monitoring program.

AREAL AND VOLUMETRIC TRENDS IN ACCRETION AND EROSION

This section of this report presents maps of bathymetry and topography compiled from the 1992 and 1993 profile data and uses these maps to determine areal and volumetric characteristics of the 1992-93 changes. All maps prepared by the ISGS were done with a GIS using ARC/INFO software.

Bathymetric/Topographic Maps

Maps of bathymetry and beach topography were constructed from a combination of City of Lake Forest and ISGS profile data. Data collected by the City of Lake Forest were used to construct those parts of the 1992 and 1993 bathymetric/topographic maps from the concrete wall at the head of the beach to a distance 800 ft (243.8 m) lakeward of the 2000-ft baseline; this is the lakeward limit of these data. Outside of this limit, ISGS long-profile data were used to construct the maps. The ISGS established and surveyed four additional lines between profile N5617 and the boat basin (profiles N5817 to N6417; see Figure 4) to provide data for this part of the project not surveyed in 1991. All contouring was done by hand prior to being digitized. This assured that any anomalous data points could be identified and that contour patterns were consistent with expected morphology of the beach and nearshore.

The bathymetric maps at a scale of 1:4,800 are shown in Figures 10 (1992) and 11 (1993). Enlargements of the beach topography and nearshore bathymetry for the beach cells and lakeward side of the breakwaters are shown at a scale of 1:2,400 in Figures 12 (1992) and 13 (1993).

In a pocket at the back of this report is a map (Plate 1) showing 1993 bathymetry and beach topography at a scale of 1:1,200. Actual data points are shown as well as contours. Only City of Lake Forest data are shown along profile segments where ISGS and City data superimpose. The one-foot contours are the same as those presented in the page-size maps in Figures 10 through 13. This 1:1,200-scale map is provided as a base map for future data comparisons. A similar map was prepared by the ISGS for the 1992 data (Trask and Chrzastowski, 1993).

FOREST PARK BEACH
LAKE FOREST, ILLINOIS

Nearshore Bathymetry

Collected by City of Lake Forest
July and August 1992

and

Illinois State Geological Survey
July 1992

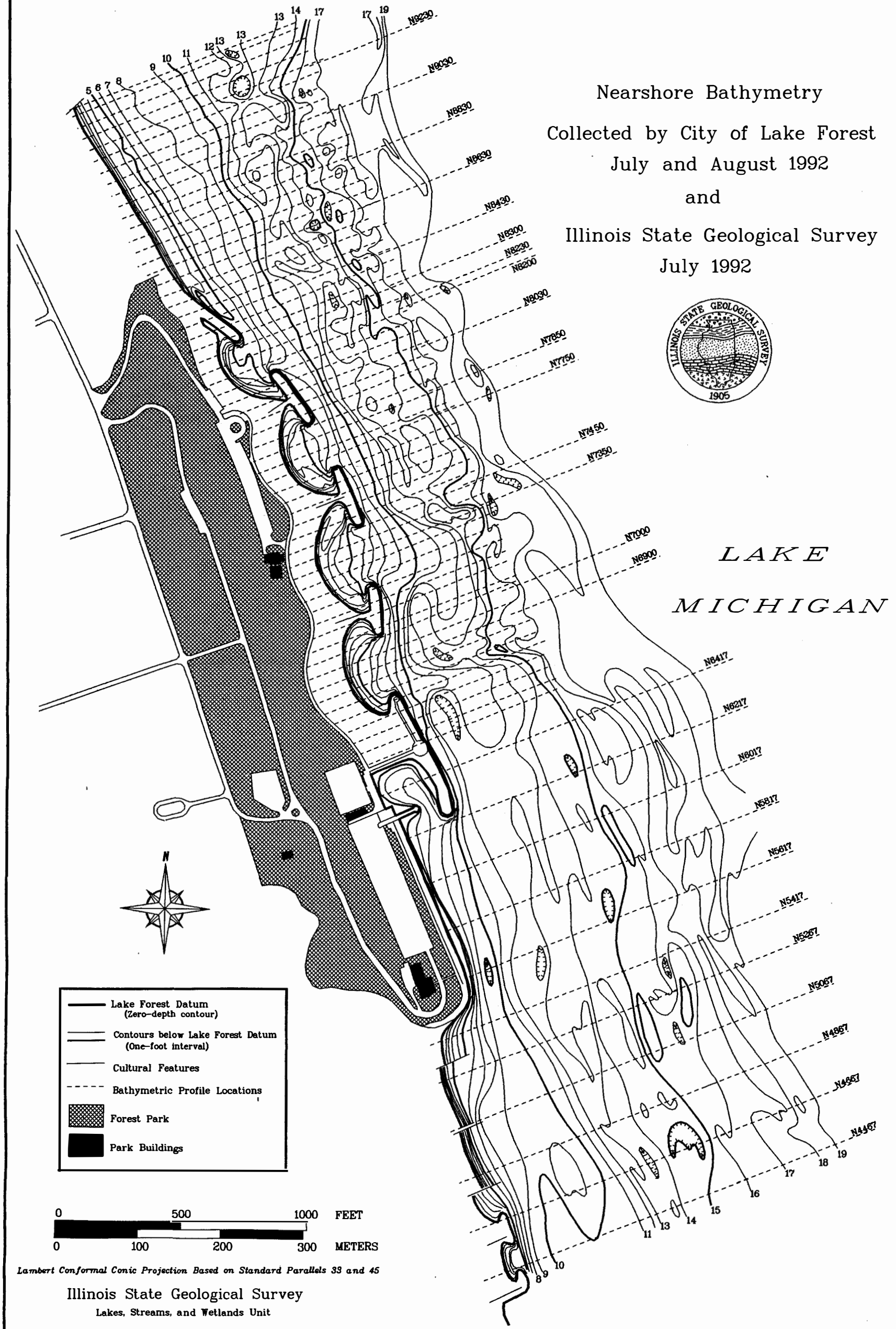


Figure 10. 1992 nearshore bathymetry of the Forest Park Beach area contoured by ISGS from profile data collected by the City of Lake Forest and ISGS in July and August 1992.

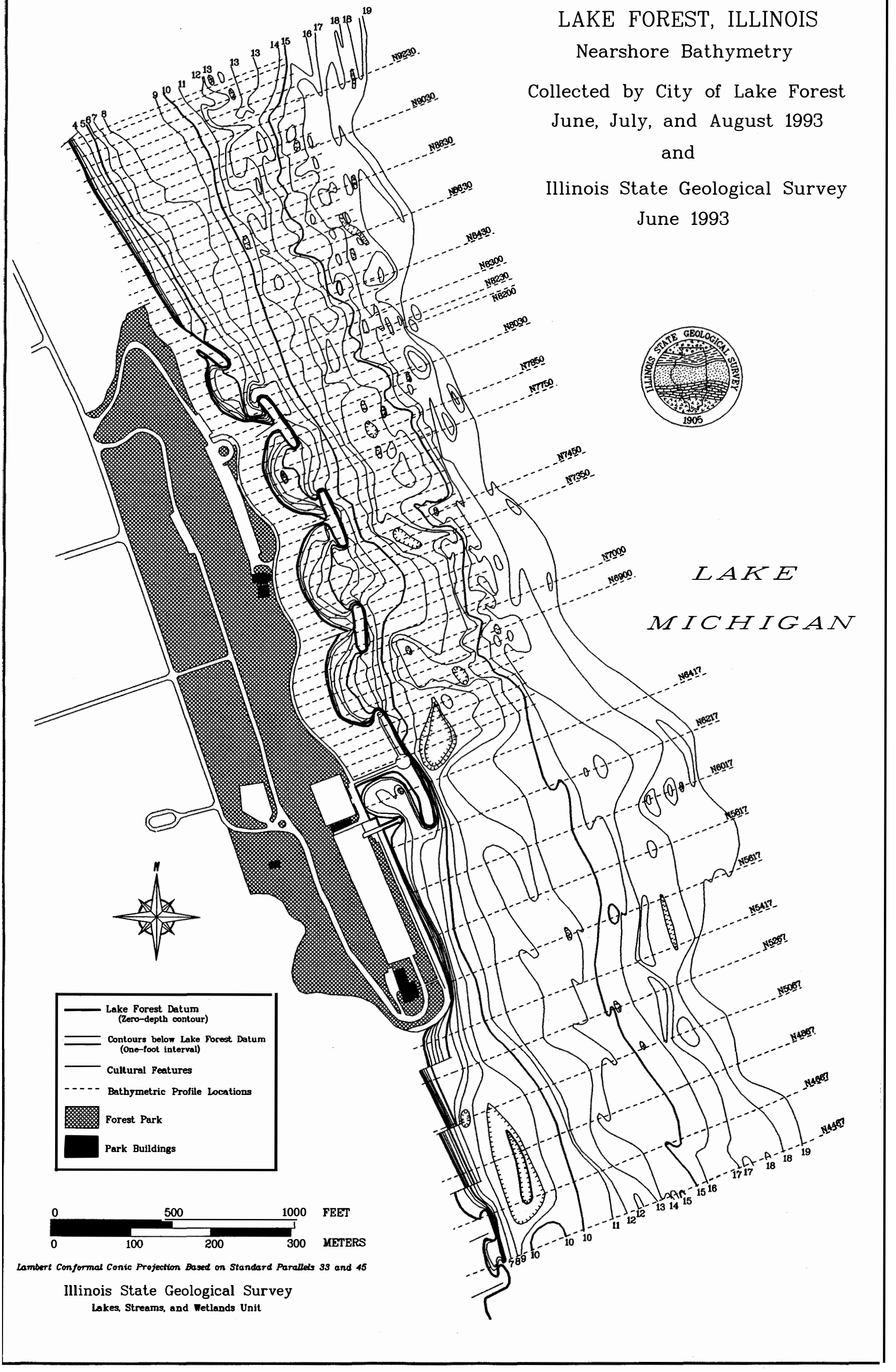


Figure 11. 1993 nearshore bathymetry of the Forest Park Beach area contoured by ISGS from profile data collected by the City of Lake Forest and ISGS in June 1993.

FOREST PARK BEACH
LAKE FOREST, ILLINOIS

Nearshore Bathymetry

and

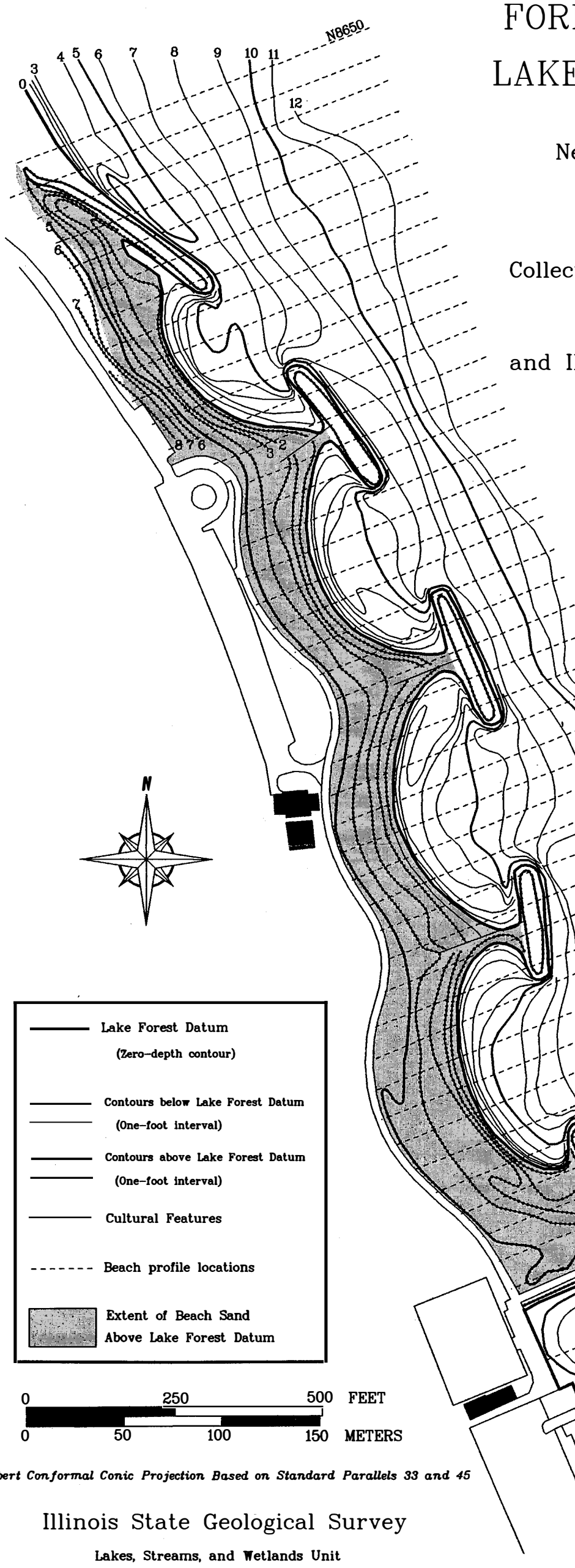
Beach Topography

Collected by City of Lake Forest

July/August 1992

and Illinois State Geological Survey

July 1992



Illinois State Geological Survey

Lakes, Streams, and Wetlands Unit

Figure 12. 1992 nearshore bathymetry and beach topography of Forest Park Beach contoured by ISGS from profile data collected by City of Lake Forest in July and August 1992.

FOREST PARK BEACH
LAKE FOREST, ILLINOIS

Nearshore Bathymetry

and

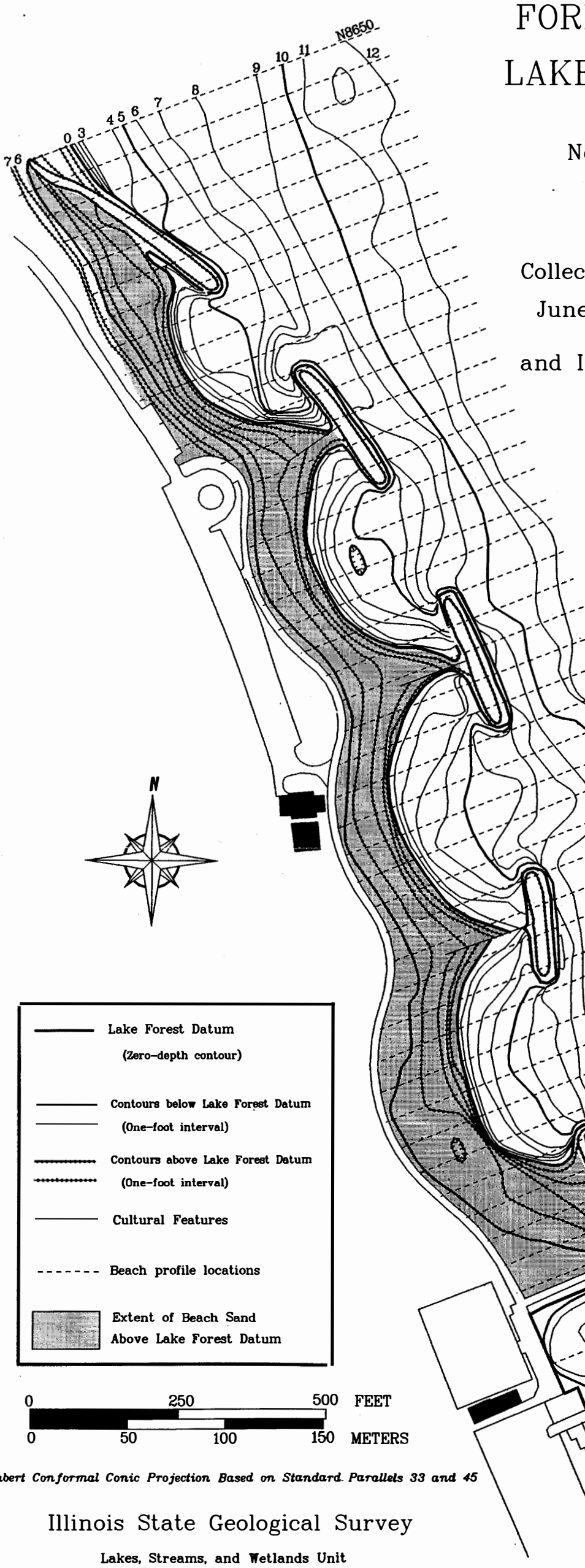
Beach Topography

Collected by City of Lake Forest

June, July, and August 1993

and Illinois State Geological Survey

June 1993



Illinois State Geological Survey

Lakes, Streams, and Wetlands Unit

Figure 13. **1993 nearshore bathymetry and beach topography of Forest Park Beach contoured by ISGS from profile data collected by City of Lake Forest in June 1993.**

Beach and Nearshore Change Map

Comparison of the 1992 and 1993 maps of beach topography and nearshore bathymetry is the basis for generating a map showing 1992-93 accretion and erosion. This mapping of annual change was done by a computer caparison of the surfaces defined by the data of the two years, and identifying areas and thicknesses of where the map comparison determined gain in elevation (accretion) or loss in elevation (erosion). The mapping procedure used is called TIN (Triangulated Irregular Network). A brief discussion of the TIN procedure applied to the Forest Park Beach data is included in the ISGS report for the 1992 monitoring (Trask and Chrzastowski, 1993). Details of the procedures for working with TIN are provided in the ARC/INFO User's Guide for Surface Modelling with TIN (Environmental Systems Research Institute, Inc., 1991).

Figure 14 is the 1992-93 beach and nearshore change map resulting from the data comparison. This map only shows area where accretion or erosion is greater than one foot (0.3 m). This one-foot datum or threshold for depicting areas of gain or loss thus focuses on the areas of major change and ignores any complex distribution of less than one-foot change.

At a one-foot datum, the monitoring area has a very patchy distribution of accretion and erosion areas. The changes are concentrated along the northern two thirds of the monitoring area. The southern third of the monitoring area has fewer areas of change.

The largest patch of accretion is lakeward of Breakwater III, just north of a depression in the lake floor opposite Beach Cell 4. As discussed in PART 2 of this report (Lake Bottom Morphology section), this accretion corresponds to the advancing toe of a wedge of sediment that is building a pathway for littoral sediment bypass of the facility. Elsewhere, accretion is confined to several patchy areas from Breakwater V to the north end of the monitoring area lakeward of the nearshore bar, at the north end of Breakwater V, in the area around Breakwaters I and II and Beach Cell 4, and in two of the groin compartments in the southern part of the monitoring area. The maximum thickness of accretion is in the range 3 to 4 ft (0.9 to 1.2 m) occurring along the beach and shallow nearshore at the south end of Beach Cell 4.

Erosion has occurred along the upper part of the fillet beach north of Breakwater VI, in Beach Cell 1 behind Breakwater V, and in Beach Cell 4. The maximum thickness of erosion is in the range 3 to 4 ft (0.9 to 1.2 m) occurring in shallow water at the south end of Beach Cell 1.

Volumetric Changes 1992-1993

Volumetric changes for the one-year interval 1992-93 were computed for the City of Lake Forest by the firm W. F. Baird & Associates (1993b). The ISGS also performed a volumetric analysis for comparison. The procedure used by Baird & Associates and the ISGS were similar, both using a TIN procedure to compare surfaces defined by the two data sets. Several differences occur in the two analyses:

1) Baird & Associates used the 1992 sand/clay interface as a boundary in defining areas for volume calculations. The ISGS used the 1992 15-foot contour as a boundary, or 12-foot contour where the interface is closer to shore. Within the monitoring area, these contours and the interface approximate each other and this is not a significant difference in procedure.

2) Baird & Associates computed volumes of change lakeward of the sand/clay interface. ISGS did not compute any changes lakeward of the 15-foot contour.

3) The ISGS used its data to compute volume changes lakeward of the southern part of Forest Park Beach (between profiles N5617 and N6550). This area was not included in the analysis by Baird & Associates since the U.S. Army Corps of Engineers does not require the City of Lake Forest to collect data here.

4) The ISGS contoured the data by hand prior to the TIN analysis. W. F. Baird & Associates performed the TIN on raw data.

Figure 15 compares the boundaries used in the 1992-93 volume calculations by ISGS and W. F. Baird & Associates. The ISGS boundaries are the same as those used in the ISGS report for the 1992 monitoring (Trask and Chrzastowski, 1993, Fig. 17).

In previous reporting of volumetric changes for 1988 through 1992, the ISGS used a one-foot datum, and all erosion or accretion less than one foot was considered within the range of potential procedural error. This is because the data were primarily from fathometer records which are less accurate than prism-pole readings. The 1992-93 comparison is a of equivalent prism-pole data sets, and thus a zero datum is appropriate.

ISGS volume calculations for several different datums (0, 0.5, 1.0, etc.) are included in APPENDIX D. Table 6 compares the ISGS calculations with the total volume calculations of the City of Lake Forest (prepared by W. F. Baird & Associates). Comparison of the gross and net changes range from good agreement to very poor agreement. A problem is that in Table 6 the City calculations are including volumes computed in City areas 5, 6, and 7 (Fig. 15) which are lakeward of the sand/clay interface and thus include erosion or accretion lakeward of the nearshore sand lens.

Table 7 is an alternate comparison of ISGS calculations and those of the City without inclusion of City areas 5, 6, and 7. In this comparison the agreement is good to excellent. The only major difference occurs in the Updrift Zone where the ISGS records a erosional net change (-300 cu yds), and the City has an accretional net change (+400 cu yds). This possibly relates to differences in the degree to which the ISGS and City include erosion along the upper part of the fillet beach (Fig. 14).

Summarizing the comparison in Table 7, the 1992-93 net accretion and erosion in the Forest Park Beach monitoring area are:

Net Accretion: 18,900 cu yds (14,500 cu m) calculated by the ISGS, and 18,300 cu yds (14,000 cu m) calculated by the City. This is a difference of 3 percent. The ISGS determined an additional 1,500 cu yds (1,100 cu m) to have accreted in the Southern Lakeward Perimeter.

Net Erosion: 15,100 cu yds (11,500 cu m) calculated by the ISGS, and 14,200 cu yds (10,900 cu m) calculated by the City. This is a difference of 6 percent. In addition, the ISGS calculated 6,500 cu yds (5,000 cu m) of erosion in the Southern Lakeward Perimeter.

Summation of the 1992-93 total accretion and erosion for City of Lake Forest areas 1 through 4 and comparable areas measured by the ISGS, results in net accretion of 4,100 cu yds (3,100 cu m) as measured by the City and net accretion of 3,800 cu yds (2,900 cu m) as determined by the ISGS. This is a difference of 8 percent.

The objective of the ISGS volume calculations is to provide an independent check on the calculations reported by the City of Lake Forest. Differences occur for individual areas of evaluation, but there is overall agreement.

The 1992-93 net change across the beach and nearshore sand of the area required for volume calculations can be summarized as follows:

1) Excluding the Southern Lakeward Perimeter Zone and excluding changes lakeward of the sand/clay interface, the ISGS and the City are in agreement within 300 cu yds, and in rounded number mid-value approximately 4,000 cu yds (3,100 cu m) of net accretion has occurred.

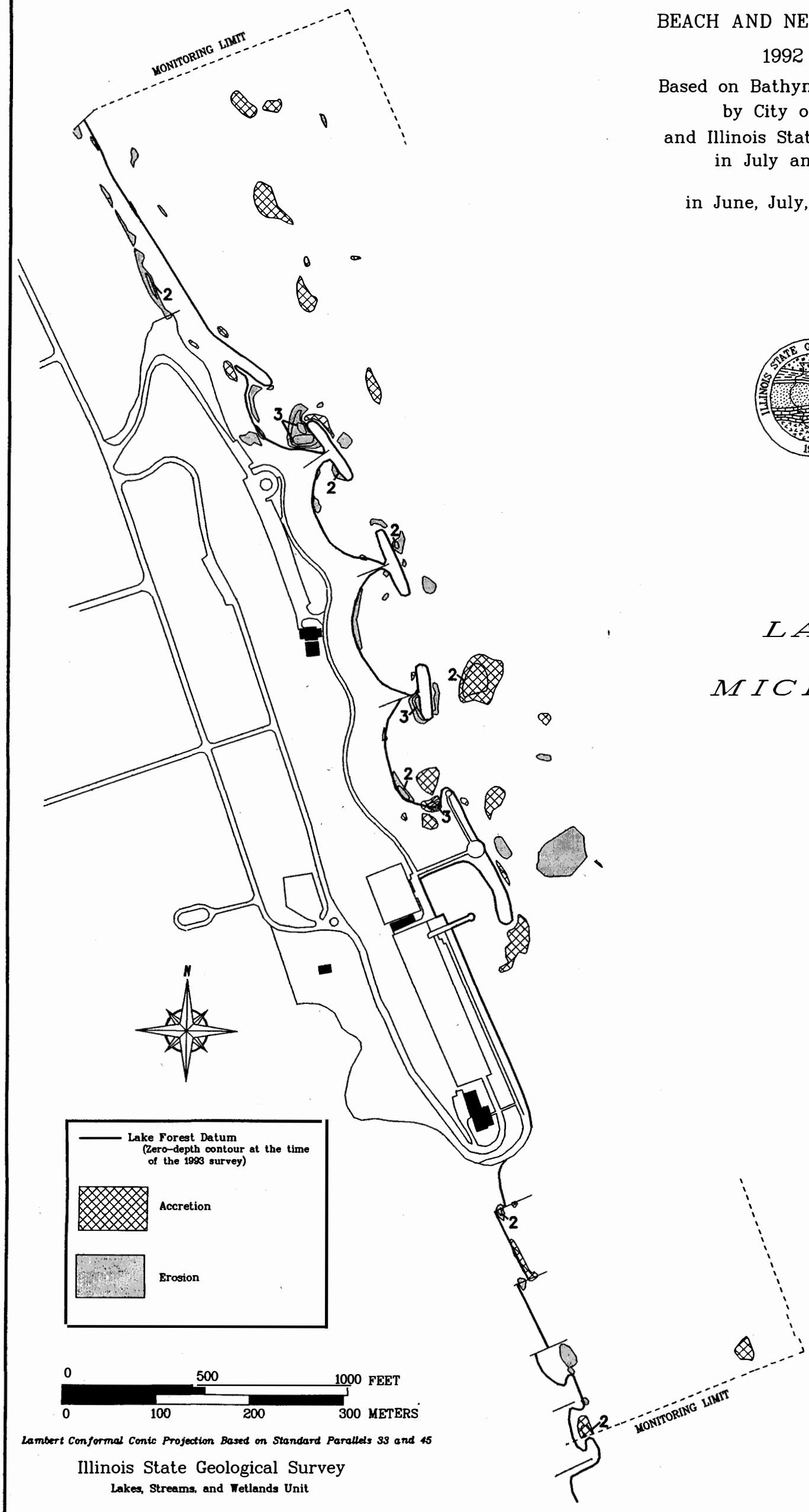
2) With inclusion of the Southern Lakeward Perimeter Zone and considering all lake-bottom landward of the 1992 15-foot contour, ISGS calculations indicate the 1992-93 net change is erosion totaling 1,200 cu yds (900 cu m).

FOREST PARK BEACH
LAKE FOREST, ILLINOIS

BEACH AND NEARSHORE CHANGES

1992 TO 1993

Based on Bathymetric Data Collected
by City of Lake Forest
and Illinois State Geological Survey
in July and August 1992
and
in June, July, and August 1993



LAKE

MICHIGAN

Figure 14. Beach and nearshore accretion an erosion changes between 1992 and 1993. Any accretion or erosion less than 1 ft is not shown because a 1-ft (0.38 m) threshold is used.

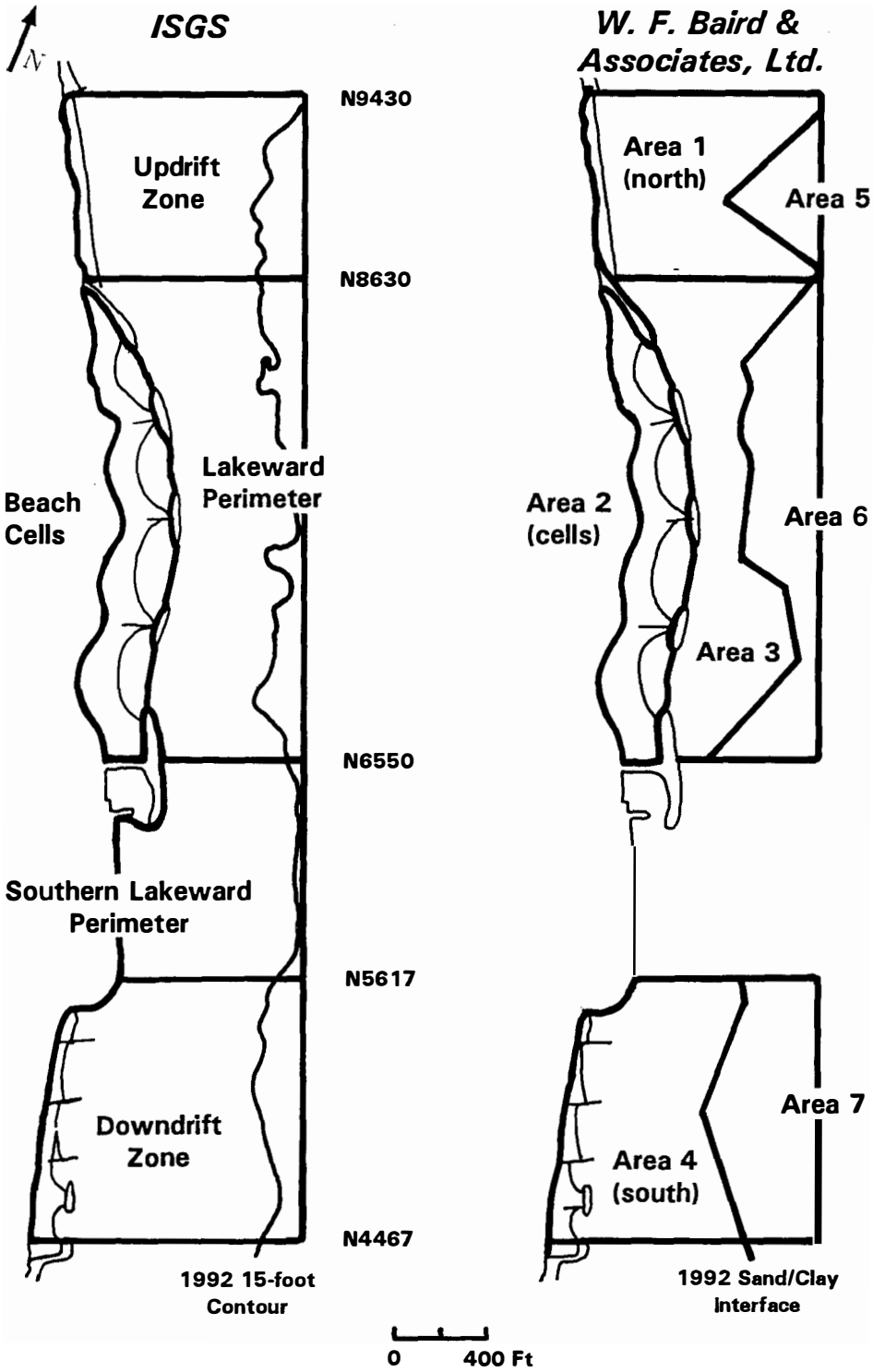


Figure 15. Comparison of how ISGS and W. F. Baird & Associates defined zones of the monitoring area for calculation of 1992-93 volumetric changes.

Long-term (1988-1993) Volumetric Changes

The ISGS report for the 1992 monitoring (Trask and Chrzastowski, 1993) included ISGS prepared and edited bathymetric maps for the monitoring area based on data collected by consultant's for the City in 1988. These data provide a baseline for comparing post-construction beach and nearshore changes in the monitoring area. Volumetric calculations for the 1988-1993 accretion and erosion for the different zones are included in Appendix D. Accretion and erosion volumes are tabulated for different datums (*i.e.*, thresholds). Although a zero datum is used in this report for the 1992-1993 comparisons, in this long-term analysis a higher threshold is necessary because of some uncertainty in the 1988 data.

The long-term volumetric changes at a 1-ft threshold are:

> Net Accretion: 4,900 cu yds (3,700 cu m) in the Beach Cells; and 25,100 cu yds (19,200 cu m) in the Lakeward Perimeter Zone
>
> Net Erosion: 700 cu yds (500 cu m) in the Updrift Zone; 1,200 (900 cu m) in the Southern Lakeward Perimeter Zone; and 2,900 cu yds (2,200 cu m) in the Downdrift Zone.

The summation for the entire monitoring area is a 1988-93 net accretion of 25,200 cu yds (19,300 cu m). The dominant area of accretion has been along the northern half of the lakeward perimeter of the project.

These numbers provide an overview of long-term changes in the monitoring area, but thorough geologic and engineering evaluation is necessary to determine to what extent construction of Forest Park Beach has influenced these trends.

Table 6. Comparison of ISGS accretion and erosion calculations with those performed by the City of Lake Forest during the 1993 monitoring season. Datum is 0.0 ft. Calculations are rounded to the nearest 100.

ZONE	ACCRETION		EROSION		NET CHANGE	
	ISGS	CITY	ISGS	CITY	ISGS	CITY
Updrift[1]	3,800	4,400	4,100	5,000	−300	−600
Beach cells[2]	3,200	2,500	5,600	3,500	−2,400	−1,000
Lakeward perimeter[3]	6,600	7,800	4,000	9,300	+2,600	−1,500
Southern perimeter[4]	1,500	--	6,500	--	−5,000	--
Downdrift[5]	5,300	4,300	1,400	4,200	+3,900	+100
Total[6]	18,900	19,000	15,100	22,000	+3,800	−3,000

1. Lake Forest areas 1 and 5.
2. Lake Forest area 2.
3. Lake Forest areas 3 and 6.
4. Not mapped by Lake Forest.
5. Lake Forest areas 4 and 7.
6. Total does not include Southern Lakeward Perimeter.

Table 7. Comparison of ISGS accretion and erosion calculations with those performed by the City of Lake Forest during the 1993 monitoring season. Datum is 0.0 ft. Data from Lake Forest areas 5, 6, and 7 are not included. Calculations are rounded to the nearest 100.

ZONE	ACCRETION		EROSION		NET CHANGE	
	ISGS	CITY	ISGS	CITY	ISGS	CITY
Updrift[1]	3,800	4,200	4,100	3,800	−300	+400
Beach cells[2]	3,200	2,500	5,600	3,500	−2,400	−1,000
Lakeward perimeter[3]	6,600	6,600	4,000	4,400	+2,600	+2,200
Southern perimeter[4]	1,500	--	6,500	--	−5,000	--
Downdrift[5]	5,300	5,000	1,400	2,500	+3,900	+2,500
Total[6]	18,900	18,300	15,100	14,200	+3,800	+4,100

1. Lake Forest area 1.
2. Lake Forest area 2.
3. Lake Forest area 3.
4. Not mapped by Lake Forest.
5. Lake Forest area 4.
6. Total does not include Southern Lakeward Perimeter.

OBSERVATIONS OF 1993 DOWNDRIFT NOURISHMENT

In 1993 the City of Lake Forest undertook the third year of a three-year beach nourishment program to compensate for sediment trapped on the updrift side of the project. The nourishment occurred on July 12, 13, 14, 15, and 16, 1993. A total of 3,729.55 cu yds (2651.24 cu m) of nourishment was delivered by truck and discharged along the more lakeward half of the south-facing, rubble-mound revetment that forms the southern limit of the project (Magnus, 1993b).

By agreement with the U.S. Army Corps of Engineers Chicago District, the City of Lake Forest was to blend a sand mixture of 40% FA-2 with 60% CA-16 to satisfy a requirement for the particle size of nourishment material to be "coarse sand" under the Unified Soil Classification. No more than 20% of the material can be larger than 10 mm, no more than 10% finer than 0.3 mm, and no more than 5% finer than 0.1 mm (City of Lake Forest, program definition for the five years 1991 through 1995). Figures 16 and 17 show the two different particle sizes that were mixed.

The ISGS monitored the nourishment operations on July 13, 1993. Figures 18, 19, 20, and 21 show some aspects of the operations on that day. The nourishment sand and gravel was dumped atop the revetment along the south end of the project (Figs. 20 and 21). Front-end loaders pushed the sediment over and down the revetment blending it and building a peninsula into the nearshore zone. This peninsula was oriented on an azimuth just lakeward of the end of the first groin south of the project. As in 1991 and 1992, the orientation was intended to aid southward sediment dispersal and to prevent having the nourishment become trapped primarily in the northernmost groin cell.

For the third-year (1993) nourishment, the City of Lake Forest was required to place 4,000 cu yds (3,058 cu m). As reported in the City of Lake Forest report for the 1993 monitoring (Magnus, 1993b), placement of 3,729.55 cu yds (2,851.24 cu m) resulted in a deficit of 270.45 cu yds (206.76 cu m) for the third year.

City of Lake Forest data on delivery of nourishment material indicate that the required volume (3,000 cu yds; 2,293.50 cu m) was supplied the first year (1991), and in the second year (1992) a surplus of 209.63 cu yds (160.26 cu m) was supplied over the required volume (*i.e.*, 3,209.63 cu yds; 2,453.76 cu m). The second-year surplus and third-year deficit result in total net deficit of 60.82 cu yds (46.49 cu m)for the required three-year (1991-1993) nourishment. The nourishment supplied is 99.4% of that required.

Figure 16. Nourishment sand stockpiled on stone revetment at south end of project prior to being pushed lakeward. Fine gravel (CA-16, light-colored material at bottom) is blended with medium sand (FA-2, darker-colored material forming mound). Photo date: July 13, 1993.

Figure 17. Close-up view of nourishment sand showing grain size difference between fine gravel (CA-16, lower material) and medium sand (FA-2, upper material). Photo date: July 13, 1993.

Figure 18. Truck delivery of nourishment material along revetment at south end of Forest Park Beach. Photo date: July 13, 1993.

Figure 19. Front loader pushing sand and gravel mixture southward into the nearshore. Photo date: July 13, 1993.

Figure 20. View looking south across the nourishment peninsula showing the orientation of the peninsula toward the lakeward end of the first groin south of Forest Park Beach. Photo date: July 13, 1993.

Figure 21. View looking northeast from the first groin south of Forest Park Beach toward the peninsula formed by nourishment sand and gravel. The delivery of nourishment material is about half complete at this time. Photo date: July 13, 1993.

ISGS Analysis of Nourishment

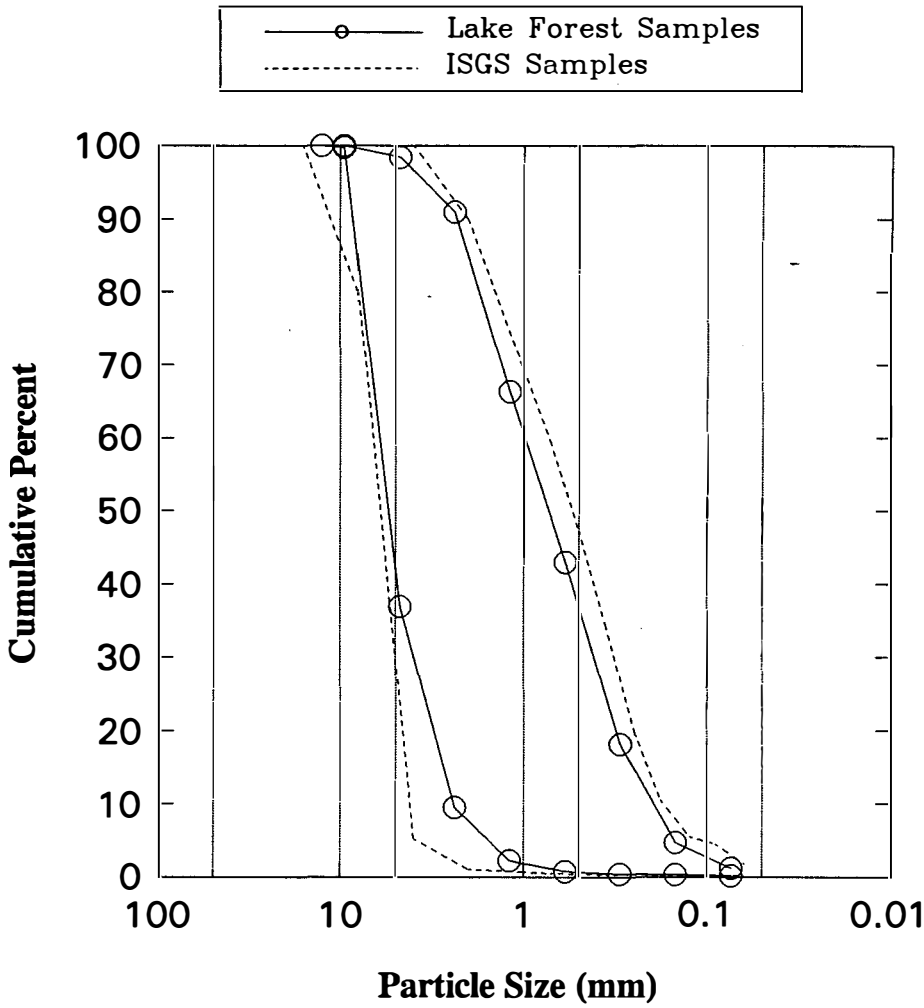
On July 13, 1993, two samples of the nourishment sediment were collected by the ISGS for grain-size analysis. One sample each of the FA-2 and CA-16 materials was collected from piles of sediment dumped by the trucks atop the revetment. Grain-size analyses of the nourishment sediment were performed by the ISGS Geotechnical Laboratory. The sieve screens ranged from -4.00 to $+4.00$ phi (16.0-0.063 mm) in half-phi intervals [$\phi = -\log_2(d_{mm})$]. The ISGS laboratory results are included in APPENDIX E. Comparison of ISGS grain-size analyses with those performed by H. H. Holmes Testing Laboratories, Inc., for the City of Lake Forest (Fig. 22) shows that the two different laboratories analyzed similar distributions and are in agreement. The ISGS examined a "spot check" sampling for one day of the multi-day nourishment; the City's analysis incorporates samples taken each of the nourishment days.

The median diameters of each of the two samples collected by the ISGS are 0.55 mm (FA-2) and 6.0 mm (CA-16). Combining these two distributions at the Lake Forest ratios of 38.9% FA-2 to 61.1% CA-16 results in a median diameter for the composite of materials applied to the beach of 4.5 mm. According to the Unified Soil Classification, these distributions have mean grain sizes of medium sand (FA-2), fine gravel (CA-16), and coarse sand (composite). Less than 10% of the mixture has a grain size larger than 10 mm. Approximately 10.5% of the composite is finer than 0.3 mm, while about 2% is finer than 0.1 mm.

> ***Conclusion:*** The 1993 nourishment-sediment mixture as placed in the nearshore zone by the City of Lake Forest meets the requirement of coarse sand according to the Unified Soil Classification.

Anticipated Nourishment Dispersion Process

Although the mixture is classified as having a median grain size of coarse sand according to the Unified Soil Classification, it is made up of two distributions having median diameters of medium sand and fine gravel. The mixture will, therefore, be transported as a medium sand and a fine gravel rather than as a coarse sand.



GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	CSE	MEDIUM	FINE	

Figure 22. Particle-size distributions of nourishment sediment samples collected and analyzed by the City of Lake Forest and by the ISGS.

PART 2: COASTAL PROCESSES

INDICATIONS OF LITTORAL SEDIMENT BYPASS

Sand/Clay Interface

Figure 23 shows the location of the sand/clay interface as mapped in 1993. For comparison, the interface is also shown for 1986, 1988, 1989, 1991, and 1992. Since 1991 and the beginning of the present monitoring program, the interface has been mapped by the City of Lake Forest using a diver survey, and is thus based on direct observation. The interface in 1986, 1988, and 1989 was mapped based on identifying the lakeward limit of the nearshore sand lens on fathometer profiles. The location of the interface in 1986 shows the preconstruction location. The 1988 location is the first year the interface was mapped following construction.

The general pattern that has been recorded for the sand/clay interface is that in 1988 (the first year following construction) the interface ran along the lakeward side of the breakwaters generally tangential to Breakwaters I and IV. In subsequent years, sand accretion occurred along the lakeward perimeter of the project shifting the location of the interface farther lakeward, such that by 1991 the interface was about 170 feet (52 m) lakeward of Breakwater IV (Fig. 23). Lack of data prevents knowing the 1991 location lakeward of Breakwater I.

In 1991, 1992, and 1993, the location of the interface has remained rather consistent lakeward of the updrift beach and lakeward of Beach Cells 1 and 2 (Breakwaters VI, V, and IV). Between 1991 and 1993 the major changes in location of the interface occurred along the southern half of the project, opposite Beach Cells 3 and 4, opposite the boat launch basin, and opposite the southern revetment.

Comparing the 1992 and 1993 interface locations, lakeward of Beach Cell 4 sand accretion occurred resulting in a southward (downdrift) shift of the interface by as much as 250 ft (76.2 m). Lakeward of the small boat basin (Breakwater I) and southward to about 360 ft (110 m) south of the southern limit of the Forest Park Beach revetment, the 1993 interface documents loss of lake bottom sand since 1992 and a landward shift of the interface by as much as 300 ft (91.4 m).

In the southernmost part of the monitoring area, the interface had the same position in 1993 as in 1992, and has been consistent in location since 1986.

In the northernmost part of the monitoring area, the 1992 interface has a double "v" pattern of lakeward protrusion. A more shore-parallel configuration for the interface is recorded in 1993. As reported by Trask and Chrzastowski (1993, p. 60) for the 1992 monitoring, this "v" pattern is likely caused by the diver survey finding some isolated sand pockets farther lakeward than the overall shore-parallel trend of the interface, and thus the "v" pattern is a mapping anomaly and should be dismissed. The correct interface location for 1992 is considered to be shore parallel, and no

significant change in interface location has likely occurred between 1992 and 1993 in this northernmost part of the monitoring area.

Recorded changes to the location of the sand/clay interface opposite the southern revetment between 1992 and 1993 suggest that substantial erosion of lake-bottom sand occurred across this area during this one-year period. However, some caution is necessary in interpreting the timing of the landward shift of the sand/clay interface in this area. The mapping by the City of Lake Forest suggests this change occurred between 1992 and 1993. As noted in the ISGS report for the 1992 monitoring (Trask and Chrzastowski, 1993b, p. 60), reconnaissance diving by ISGS divers in the summer of 1992 showed that from Breakwater I southward to the southern limit of the riprap revetment, the sand lens was narrow and the interface was tangential to the riprap at a point just north of the southern limit of the riprap. These ISGS diver observations were made prior to the 1992 sand nourishment, and the City of Lake Forest observations were made after the 1992 nourishment. Thus the 1992 location of the interface lakeward of the south revetment may reflect dispersion of the nourishment sand and the short-lived condition of a more robust sand cover. The 1993 sand/clay interface was mapped prior to the 1993 nourishment and may represent the more "typical" extent of sand cover in this area.

A purpose in monitoring location of the sand/clay interface is to document trends in accretion and erosion of the nearshore sand lens. The accretion that occurred between 1992 and 1993 lakeward of Beach Cell 4 is a trend consistent with the continuing southward development of a pathway for sand bypass (*i.e.*, a "sand bridge") along the lakeward perimeter of the project.

The area of lake bottom opposite the south revetment is where the location of the sand/clay interface needs to be closely monitored in the next two years of the monitoring program (*i.e.*, 1994 and 1995). No additional beach nourishment is planned, and thus changes in location of the interface will directly reflect gain or loss of sand from the littoral stream. The lake bottom at and near the southern limit of the monitoring area also needs to be closely monitored in the next two years since this area may have significant change to the location of the interface because of the end of nourishment operations.

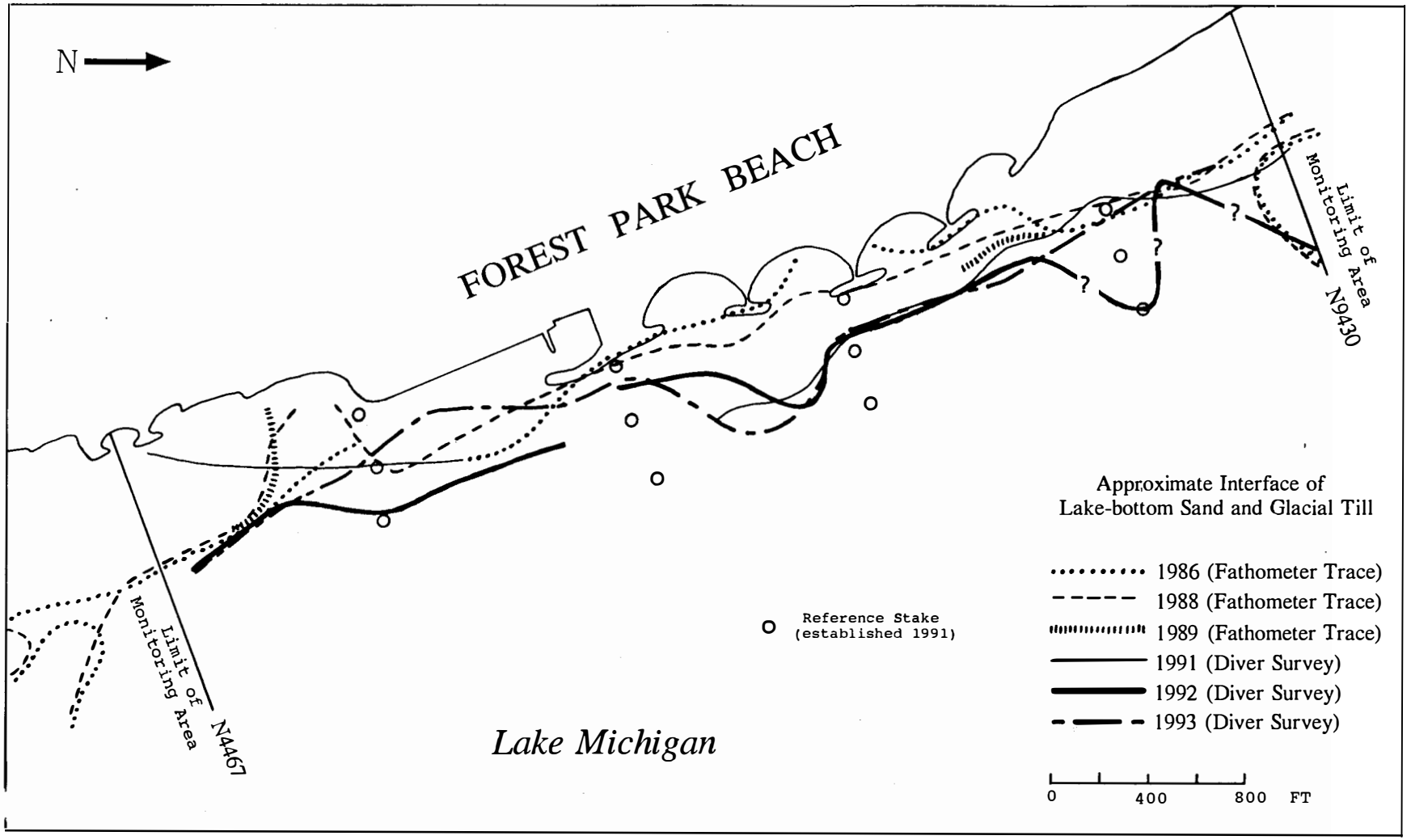


Figure 23. Location of the interface of lake-bottom sand and clay (*i.e.*, glacial till). 1986, 1988, and 1989 mapping from Lake Forest Shoreline Monitoring Committee (1990b); 1991 mapping from CH2M HILL (1992); 1992 mapping from Magnus (1993a); 1993 mapping from Magnus (1993b).

6Lake-Bottom Morphology

The configuration of bathymetric contours around the lakeward perimeter of the Forest Park Beach facility is an additional indicator of an ongoing process of sand bypass which is building a "sand bridge" around the project. As noted in the ISGS report for the 1992 monitoring, the 10-foot contour is a good indicator of the extent of the accretionary wedge building around the lakeward side of the breakwaters. This accretion is essentially a southward continuation of the nearshore bar that formed to the north (updrift) of the northern breakwater in the early post-construction history.

Figure 24 compares the 10-ft and 12-ft contours in 1992 and 1993. Progressing from north to south, the landward offset of the 10-ft contour opposite Breakwater III shows the leading edge of this feature. Some accretion occurred between 1992 and 1993 shifting the 10-ft contour southward (downdrift), but this was minor. Much greater accretion and downdrift shift of a contour occurred for the 12-ft contour. This indicates that the major accretion was involved in building the toe of this accretionary wedge. There is a shallow depression of the lake bottom (13- to 14-ft depths) opposite Beach Cell 4 and Breakwaters I and II (Figs. 11 and 13). The infilling of this low area is slowing the southward advance.

LITTORAL TRANSPORT RATES AND BUDGETS

As discussed in the ISGS report for the 1992 monitoring (Trask and Chrzastowski, 1993), a large volume of sediment was apparently available for entrapment at the project in the early years following the project construction, but the supply has apparently diminished with time. The interval 1992-1993 did not involve major accretion.

Data are insufficient to determine causes for this trend in sediment supply, and the supply may change with time. The previous report by Trask and Chrzastowski (1993) has mentioned that any thorough evaluation of littoral transport processes at Forest Park Beach requires consideration of the dynamics of littoral sediment bypass of the harbor at Naval Training Center Great Lakes, bypass operations related to dredging at Waukegan Harbor, and sediment supply and dynamics along the shore north of Waukegan Harbor to North Point Marina at the Illinois-Wisconsin state line.

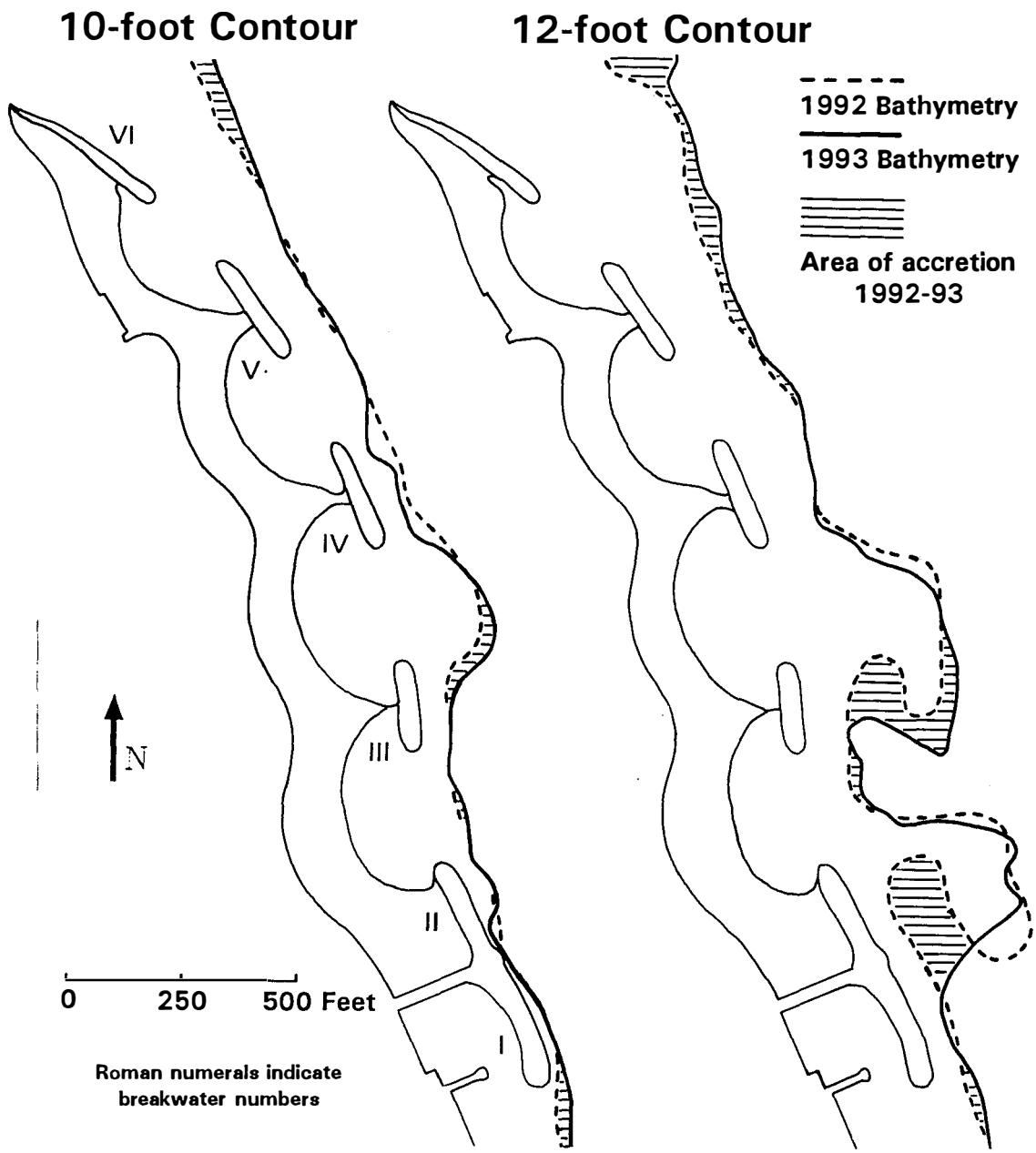


Figure 24. Location of 10-ft and 12-foot bathymetric contours in 1992 and 1993. The 10-foot contour defines the leading edge of the accretionary wedge opposite Breakwater III. The 12-foot contour shows the major 1992-93 accretion which is building the base for continued southward (downdrift) advance of this accretion.

PART 3: SUMMARY

RECOMMENDATIONS FOR FUTURE MONITORING AND REPORTING

1) Addition of Profile Lines

Profile data should continue to be collected along the lines between Breakwater I and the south end of the riprap opposite the south parking area (*i.e.*, between profiles N6550 and N5617). This is, or soon will be, the site for development of an accretionary wedge from natural bypass of the project. Monitoring the development of and changes to this accretion will require profiles along this reach. In the 1992 and 1993 monitoring by the ISGS, additional lines were run along this reach at 200-foot (61-m) line spacing. The City of Lake Forest apparently plans to voluntarily expand their monitoring area in the 1994 (Year 4) data collection to include profile data collection along this reach at 200-foot (15-m) line spacing. This will be a valuable addition of data collection and should be continued in 1995.

2) Preferred Data Collection Method

The method used by the City of Lake Forest to collect nearshore profile data using a total station and a prism pole held from a boat moving along the profile line is one of the most accurate and precise means of collecting profile data. This method should be used through the remainder of the monitoring program.

3) Lakeward Extent of Profile Lines

The data collected in 1993 document that the littoral sand occurs in a rather narrow band lakeward to a maximum depth of about 14 ft LFD. This is within a distance of 800 to 1000 ft (244 to 305 m) from the shoreline north and south of the project and 400 to 500 ft (122 to 152 m) lakeward of the project breakwaters. The long profile lines greatly exceed the lakeward limit of the nearshore sand and extend across the glacial-till lake bottom. The short lines are of adequate lakeward extent for this monitoring project. This recommendation was previously made in the City of Lake Forest's 1991 report (CH2M HILL, 1992) and was included in the recommendations of the two previous ISGS reports (Chrzastowski and Trask, 1992; Trask and Chrzastowski, 1993).

4) Presentation of Profile Data

Profile data gathered by the City of Lake Forest in the 1994 and 1995 monitoring should be presented in tables that show consecutive points for all onshore and offshore data for each profile and should be consistently ordered in either a shoreward or lakeward direction. Random points not considered part of the data set for monitoring purposes should be deleted from the lists. Data sets for individual profiles should be separated from each other and labeled. They should not be presented in a single list, as occurs from simply printing the field data from the electronic notebook

used with the total station. Separating the data by profile will make it easier to use in the future and will assist in reviewing data for any particular profile of interest. Both the 1992 and 1993 City of Lake Forest data have been presented as a simple printout of the field data.

5) Map Presentation of Elevation Data

The City of Lake Forest needs to be certain that no spurious points occur in the X-Y-Z data set that they present in tabular form and in map form. These points can be identified by conducting a visual inspection or hand contouring of the plotted data set. A computer-generated contouring of the data set will not adequately identify such spurious points and may actually result in an erroneous contour map. Correction or removal of spurious points must be assured prior to doing any volumetric analysis.

6) Regional Perspective on Littoral Transport Processes

The monitoring program focuses on accretion and erosion in the vicinity of Forest Park Beach but, in considering this project's impact on littoral transport, it may become necessary to gain a broader perspective of littoral transport processes and coastal management occurring updrift in the vicinity of the Naval Training Center at Great Lakes, the Waukegan Harbor entrance, and even northward along the shore of Illinois Beach State Park to North Point Marina. For example, an increase in entrapment at Forest Park Beach may relate to increased dredging and dredge disposal from Waukegan Harbor, which in turn results in increased bypass of the Naval Training Center harbor.

CONCLUSIONS

The 1993 data collection at Forest Park Beach is the third year in a proposed five-year monitoring program that will span 1991 through 1995. Final evaluation of the impact of this project on local littoral-transport processes and identification of any adverse impacts will occur at the completion of the five years of monitoring.

The role of the ISGS during the 1993 monitoring program was to act as an independent reviewer of the data collection and data presentation by the City of Lake Forest. The 1993 ISGS data collection and data processing also provide supplemental information to complement the 1993 work done by the City of Lake Forest. The following conclusions are drawn from the review and study by ISGS:

1. The method used by the City of Lake Forest for acquisition of profile data is strongly recommended for use in the two remaining years of the planned five-year monitoring program. The database collected by the City of Lake Forest in 1992 and 1993 is the most detailed database collected at Forest Park Beach since post-construction monitoring began in 1987.

2. Profile data collected by the City of Lake Forest in 1993 have been verified by the ISGS as being accurate, reproducible, and valid for comparison against future monitoring data.

3. The 1993 beach nourishment supplied by the City of Lake Forest (3,729.55 cu yds; 2,851.24 cu m) consisted of two components of medium sand and fine gravel. The City reported that a 40%-60% mixture of these two components would have a median diameter of coarse sand and thus satisfy the requirement of the Chicago District, U.S. Army Corps of Engineers that the nourishment must be classified as coarse sand according to the Unified Soil Classification (USC). Grain-size analysis by the ISGS of a 40-60% mixture resulted in a median diameter of 4.5 mm which is a coarse sand according to the USC. This confirms the size analysis reported by the City and verifies that the nourishment meets the requirements of the U.S. Army Corps of Engineers.

4. Although the nourishment mixture has a median diameter of a coarse sand, the nourishment will be transported and dispersed as a medium sand and a fine gravel.

5. The 1993 beach nourishment was the final nourishment in the planned three years of nourishment. During the three years (1991, 1992, and 1993) the City was required by the U.S. Army Corps o Engineers to supply a total of 10,000 cu yds (7,645 cu m) of material on the downdrift side of the project. Based on records reported by the City (Magnus, 1993b), summation of the three years of delivered nourishment indicate a deficit of 60.82 cu yds (46.49 cu m).

6. Comparison of topographic and bathymetric data collected in 1992 and 1993 indicate that beach and lake-bottom accretion and erosion greater than one foot in thickness occurred in a patchy distribution primarily in the northern two thirds of the monitoring area. For both accretion and erosion the maximum thicknesses were in the range 3 to 4 ft. Maximum accretion occurred along the beach and shallow nearshore at the south end of Beach Cell 4. Maximum erosion occurred on the lake bottom at the south end of Beach Cell 1 generally behind Breakwater V.

7. Volumetric calculations of 1992-93 accretion and erosion in the monitoring area were reported by the City of Lake Forest (work performed by W. F. Baird & Associates, Ltd.). An independent volume calculation by the ISGS results in close agreement. Comparing a summary of all common areas in the two analyses, between 1992 and 1993, accretion was the net change across the beaches and nearshore zone of the monitoring area. For a zero datum (*i.e.*, all changes greater than 0 ft), and rounded to the nearest 100 cu yds/cu m, the 1992-93 estimates of net accretion volume are:

    + 3,800 cu yds (2,900 cu m) (ISGS)
    + 4,100 cu yds (3.100 cu m) (City of Lake Forest).

The primary area of 1992-93 accretion was along the lakeward perimeter of the project. It is important to note that these figures do not include volume changes across the lake bottom from the north end of Breakwater I to the south end of the southern revetment (*i.e.*, between profiles N6550 and N5617). According to the approved monitoring program, the City is not required to collect data in this area.

8. Based on the 1992-93 volumetric calculations by the ISGS using a zero datum and the 15-ft contour as a lakeward boundary, the volume changes (rounded to nearest 100) are:

<u>Net Erosion:</u>	
Updrift Zone	(-300 cu yds; -200 cu m)
Beach Cells	(-2,400 cu yds; -1,800 cu m)
Southern Lakeward Perimeter	(-5,000 cu yds; -3,800 cu m)
<u>Net Accretion:</u>	
Lakeward Perimeter	(+2,600 cu yds; +2,000 cu m)
Downdrift Zone	(+3,100 cu yds; +2,400 cu m)

9. The volumes computed by the ISGS include the area between profiles N6550 and N5617 (ISGS Southern Lakeward Perimeter), and thus the summation of these volumes provide a complete documentation of 1992-93 net change in the entire monitoring area. ISGS data indicate substantial net erosion occurred between 1992 and 1993 in the Southern Lakeward Perimeter (-5,000 cu yds; -3,800 cu m). The summation of net changes in Item 8 results in a 1992-93 net erosion of 1,200 cu yds (1,000 cu m).

10. Based on ISGS volumetric calculations for the interval 1988-1993 (the first five years following construction), and using a 1-ft threshold for recording erosion or accretion changes, the following volumes are computed (rounded to the nearest 100):

Net Erosion:

Updrift Zone	(-700 cu yds; -500 cu m)
Southern Lakeward Perimeter	(-1,200 cu yds; -900 cu m)
Downdrift Zone	(-2,900 cu yds; -2,200 cu m)

Net Accretion:

Beach Cells	(+4,900 cu yds; +3,700 cu m)
Lakeward Perimeter	(+25,100 cu yds; +19,200 cu m)

The summation is net accretion of 25,200 cu yds (19,300 cu m). This volume has limited application at this time relative to determining how much littoral sediment the project has trapped since construction. Such a determination will be made at the conclusion of the ongoing five-year monitoring program.

11. Between 1992 and 1993 one of the major changes in location of the sand/clay interface occurred lakeward of Beach Cell 4 where the interface shifted southward (downdrift). This shift in position is consistent with the continuing southward extension of an accretionary wedge along the lakeward perimeter of the project. Mapping by the City of Lake Forest indicates that between 1992 and 1993 a landward shift of the sand/clay interface occurred in the area opposite the southern riprap. However, ISGS reconnaissance diving in this area in 1992 previously documented the more landward position of the interface. This may only be an apparent shift due to the 1992 mapping by City of Lake Forest occurring after the 1992 beach nourishment and the more lakeward position in 1992 resulting from dispersion of the nourishment sand.

12. Several lines of evidence document the continuing development of an accretionary wedge along the lakeward perimeter of the project forming a sand bridge for natural bypass of the project. These include the lake-bottom morphology, trends in accretion and changes to the lake-bottom morphology, location of the sand/clay interface and trends in changes to the location of the interface. As of the 1993 data collection, the leading edge of this accretionary wedge is opposite Breakwater III. Some southward advance occurred between 1992 and 1993, but advance during this time was slowed by the need to infill an area of lake-bottom depressions opposite Beach Cell 4 and Breakwaters I and II.

ACKNOWLEDGEMENTS

This monitoring project by the Illinois State Geological Survey (ISGS) at Forest Park Beach could not have been successfully completed without the cooperation and

assistance of the City of Lake Forest Engineering Department, Police Department, and Department of Parks, Forestry and Public Works. The staff in charge of Forest Park Beach were particularly helpful in providing assistance for short-term storage of the ISGS boat and other equipment, and other varied logistics related to the ISGS field work.

ISGS personnel assisting in the field studies at Forest Park Beach were Robert A. Lambert and Aaron J. Trask. Christopher L. Rompot assisted with the data processing and computer plotting of base maps, profiles, and profile comparisons, as well as preparation of graphics for the final report. Christine S. Fucciolo conducted GIS work in preparing plots of bathymetry and lake-bottom change, and performing the volumetric analysis for 1992-93 accretion and erosion. Additional GIS assistance was provided by Paul D. Terpstra.

This study was primarily funded by the Illinois Department of Transportation (IDOT) Division of Water Resources (DWR) under IDOT Project No. WR-09118/SRA-190. Additional funding was provided by the ISGS.

REFERENCES CITED

Anglin, C. D., MacIntosh, A. M., Baird, W. F., and Werren, D. J., 1987, Artificial beach design, Lake Forest, Illinois: in Magoon, O. T., and four others (eds.), Coastal Zone '87, Proceedings of the Fifth Symposium on Coastal and Ocean Management, Seattle, Washington, May 26-29, 1987, American Society of Civil Engineers, New York, v. 1, p. 1121-1129.

Baird & Associates, W. F., 1993a, Data conversion and volumetric analysis, 1988 to 1992, Forest Park Beach: prepared for The City of Lake Forest, August 23, 1993: W. F. Baird & Associates, Ltd., Madison, Wisconsin, 18 p.

Baird & Associates, W. F., 1993b, Data conversion and volumetric analysis, 1992 to 1993, Forest Park Beach: prepared for The City of Lake Forest, December 7, 1993: W. F. Baird & Associates, Ltd., Madison, Wisconsin, 4 p., 13 drawings.

CH2M HILL, 1992, Shoreline monitoring of Forest Park Beach, Lake Forest, Illinois, Volume 1: CH2M HILL, Bellevue, Washington, 11 p. plus 2 tables, 8 figures, 4 appendices.

Chrzastowski, M. J., and Trask, C. B., 1992, Review of the final report for the 1991 beach and nearshore monitoring program at Forest Park Beach, Lake Forest, Illinois: contract report submitted to Illinois Department of Transportation Division of Water Resources (Project WR-09118/SRA-190), Illinois State Geological Survey, Champaign, Illinois, 64 p. plus four appendices.

Environmental Systems Research, Inc., 1991, Surface modeling with TIN, ARC/INFO Users Guide Rev. 6.0: Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, 213 p. plus four appendices.

Lake Forest Shoreline Monitoring Committee, 1990a, A review of assessment of the shoreline monitoring program for the Forest Park shoreline development project, Lake Forest, Illinois, Executive Summary and Report (Part 1 of 2): The Lake Forest Shoreline Monitoring Committee, Lake Forest, Illinois, 74 p.

Lake Forest Shoreline Monitoring Committee, 1990b, A review of assessment of the shoreline monitoring program for the Forest Park shoreline development project, Lake Forest, Illinois, Appendices (Part 2 of 2): The Lake Forest Shoreline Monitoring Committee, Lake Forest, Illinois, 123 p.

Magnus, K. M., 1993a, The City of Lake Forest 1992 Forest Park Beach monitoring program, volume 1: The City of Lake Forest, Illinois, 11 p. plus three appendices.

Magnus, K. M., 1993b, The City of Lake Forest 1993 Forest Park Beach monitoring program, volume 1: The City of Lake Forest, Illinois, 11 p. plus four appendices.

Trask, C. B. and Chrzastowski, M. J., 1993, Review of the final report for the 1992 beach and nearshore monitoring program, Forest Park Beach, Lake Forest, Illinois: contract report submitted to Illinois Department of Transportation (IDOT) Division of Water Resources (IDOT Project No. WR-09118/SRA-190) Illinois State Geological Survey, Open File Series 1993-11, Champaign, Illinois, 78 p. plus 7 appendices, 1 map (scale 1:2400).

DISTRIBUTION LIST

Bound copies of this report have been sent to the offices and libraries listed below. Copies of this report are available at cost of reproduction from the Illinois State Geological Survey.

Offices

Illinois Department of Transportation
Division of Water Resources
Chicago, Illinois

The City of Lake Forest
Lake Forest, Illinois

U.S. Army Corps of Engineers
Chicago District
Chicago, Illinois

Libraries (Local and State)

City of Lake Forest Library
Lake Forest, Illinois

City of Chicago Library
Harold Washington Center
Chicago, Illinois

Illinois State Geological Survey
Library
Champaign, Illinois

Illinois State Water Survey Library
Champaign, Illinois

Illinois State Library
Springfield, Illinois

Libraries (Federal)

U.S. Geological Survey Library
Reston, Virginia

U.S. Army Corps of Engineers
Chicago District Library
Chicago, Illinois

U. S. Army Corps of Engineers
North Central Division Library
Chicago, Illinois

U.S. Army Corps of Engineers
Waterways Experiment Station
CERC Library
Vicksburg, Mississippi

APPENDIX A

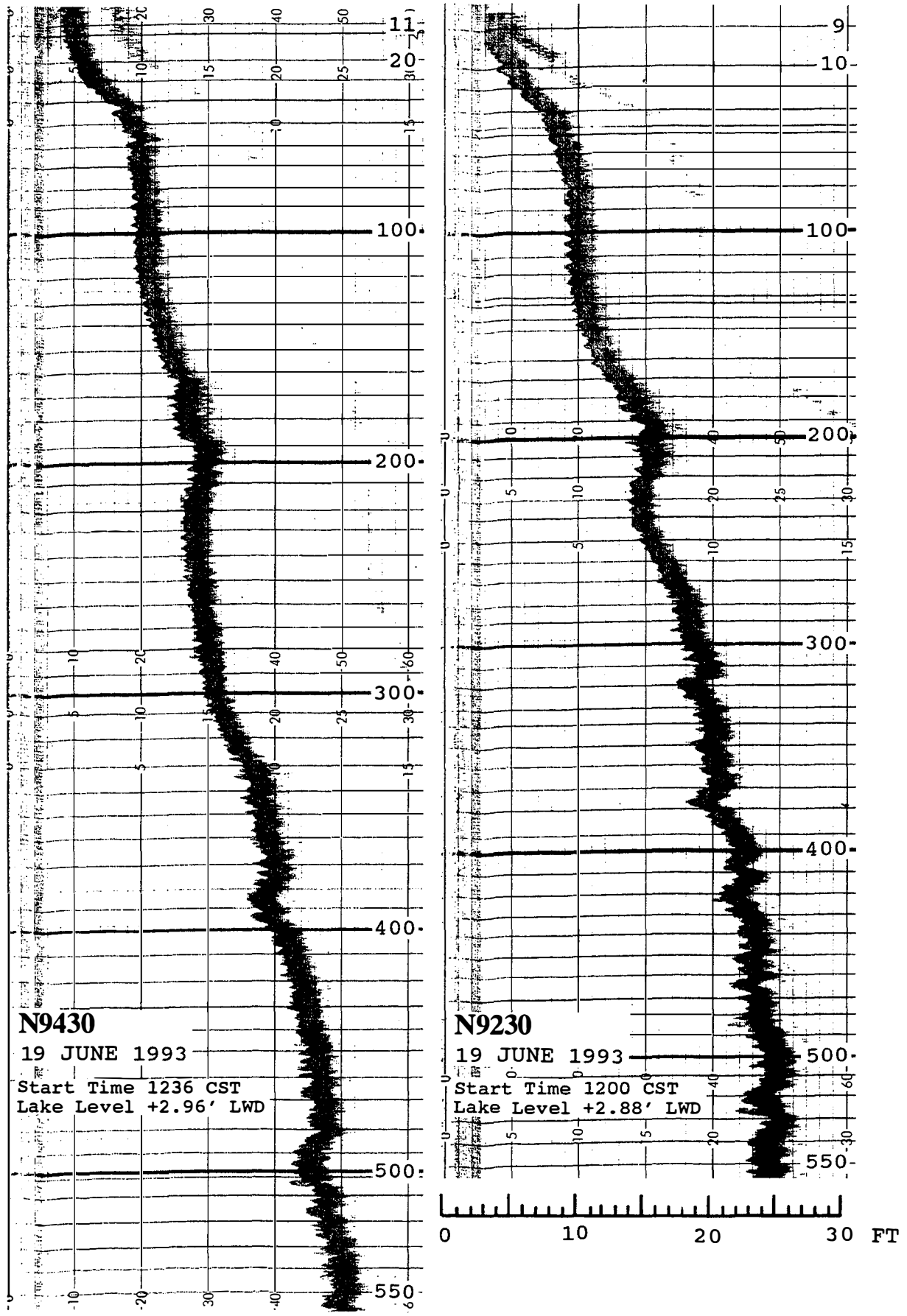
ISGS Fathometer Traces for June 1993

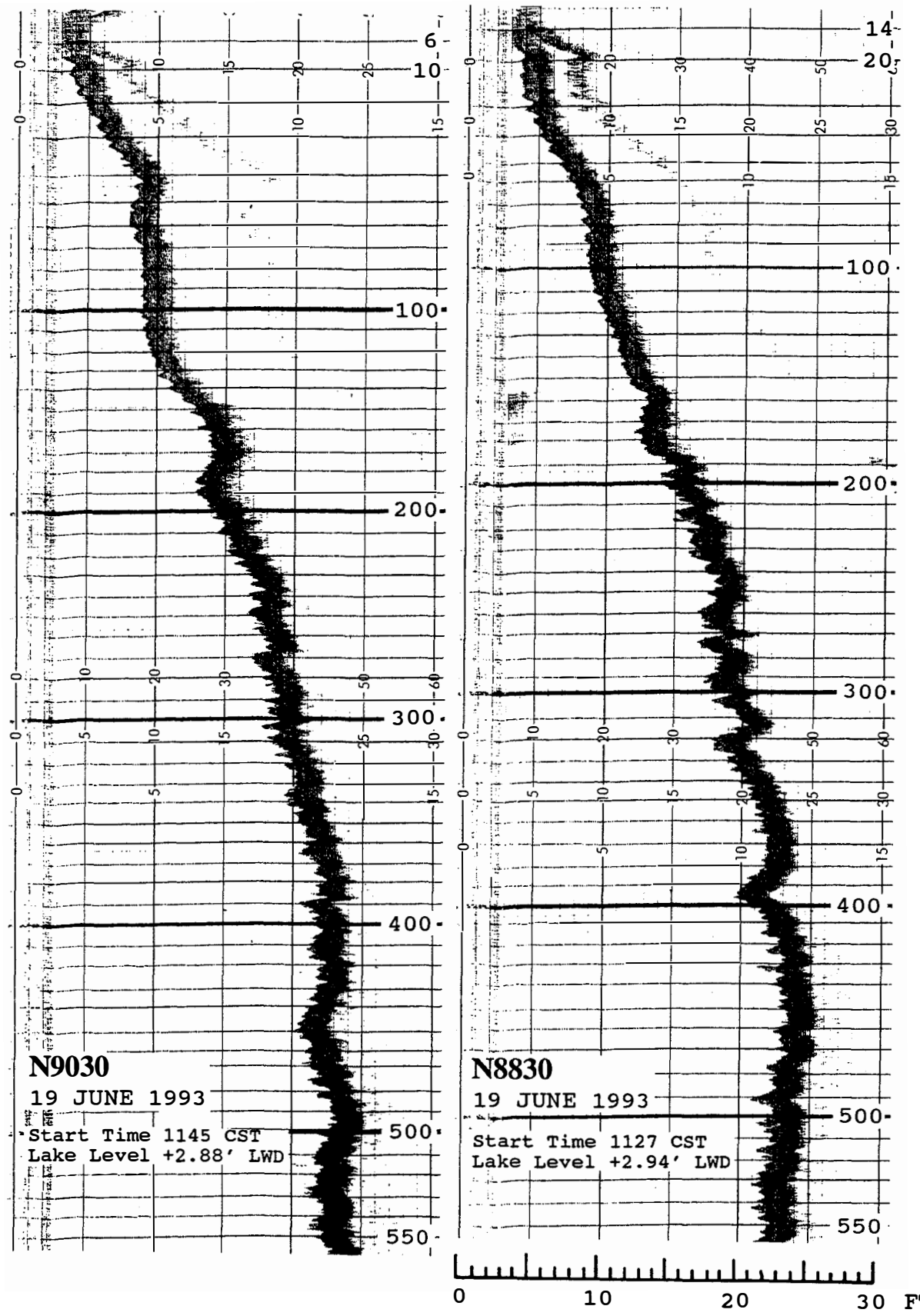
EXPLANATION

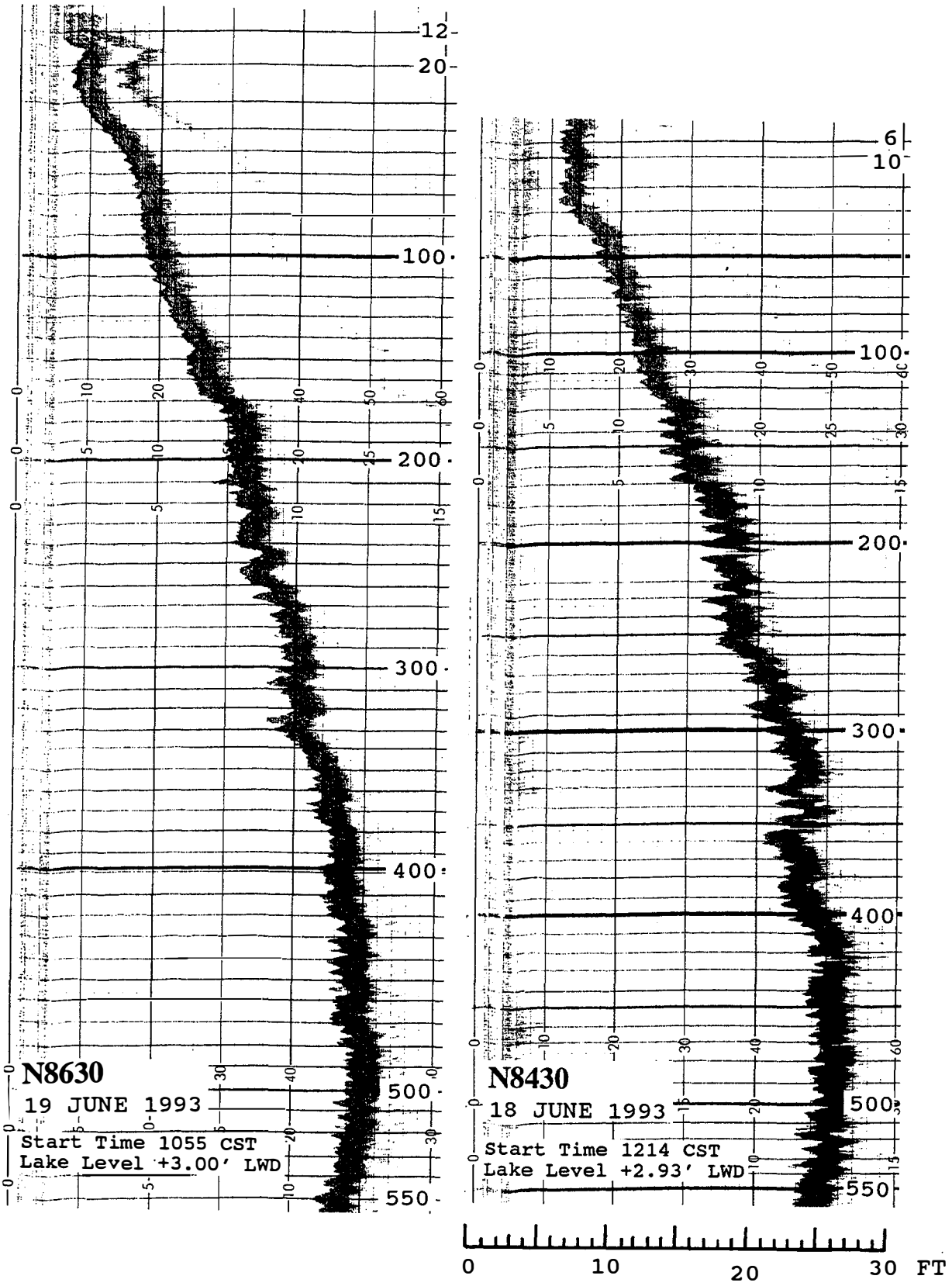
The following are photo-reduced copies of the ISGS fathometer strip charts for a distance of 1,804 ft (550 m) from the profile control point (lines N8630 and N8030 go to 500 m).

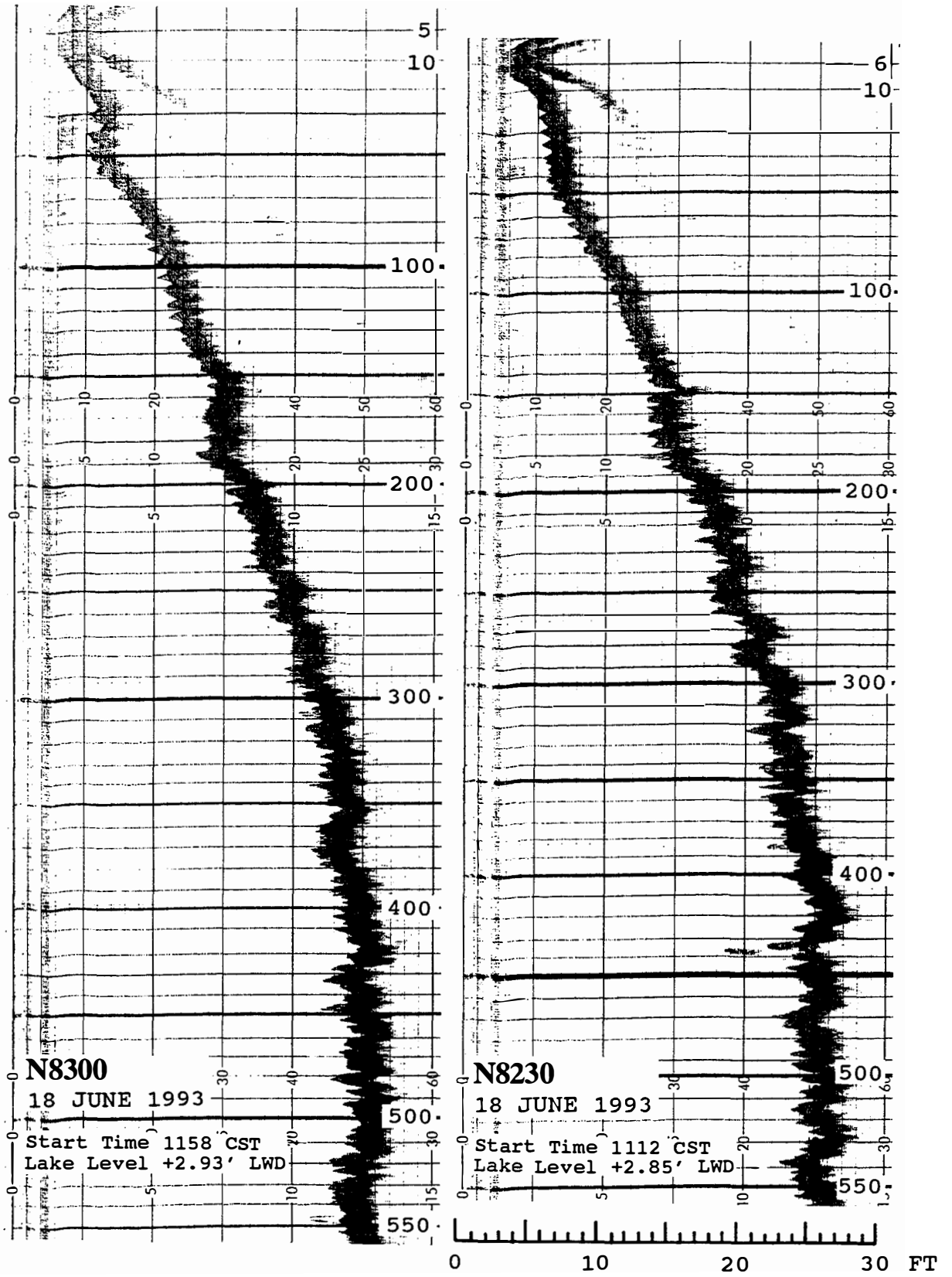
Vertical lines across the fathometer trace are event marks corresponding to 32.8 ft (10 meter) increments as displayed on the console for the Motorola Mini-Ranger III.

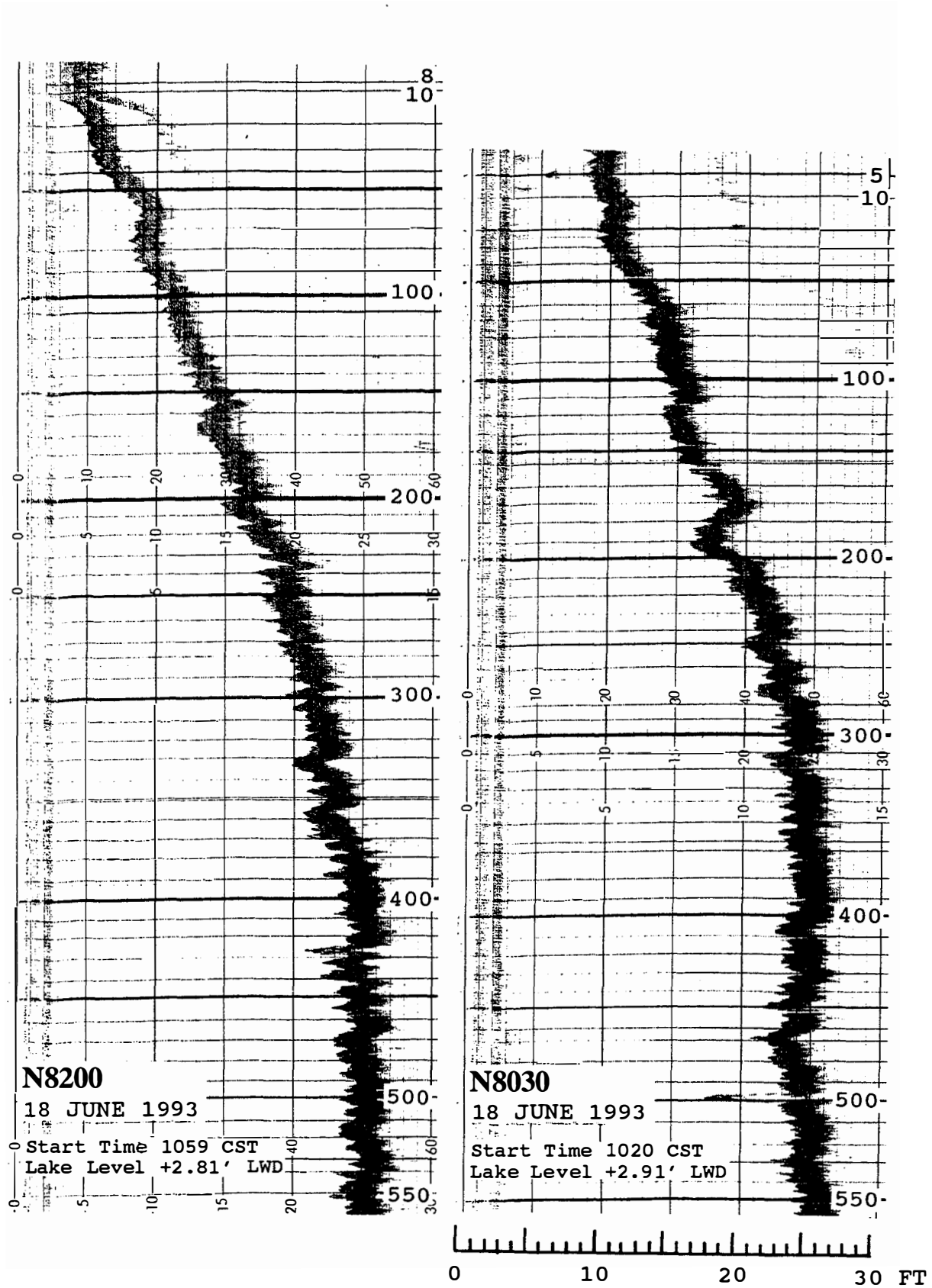
Depth is recorded in feet referenced to the lake level at the time of the survey. No transducer draft correction is needed because the fathometer trace already incorporates this correction.

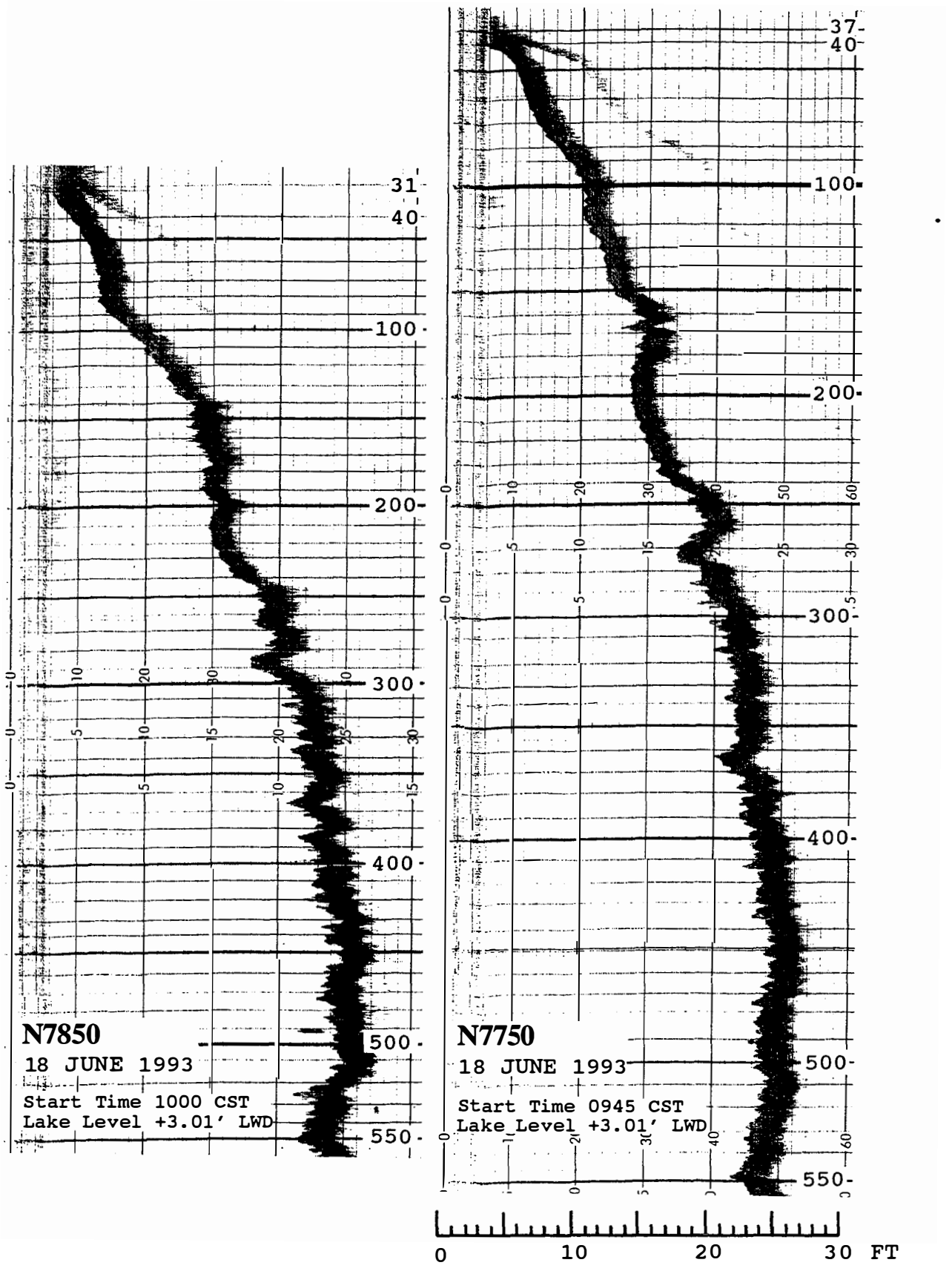

N9430
19 JUNE 1993
Start Time 1236 CST
Lake Level +2.96' LWD
N9230
19 JUNE 1993
Start Time 1200 CST
Lake Level +2.88' LWD
0
10
20
30 FT

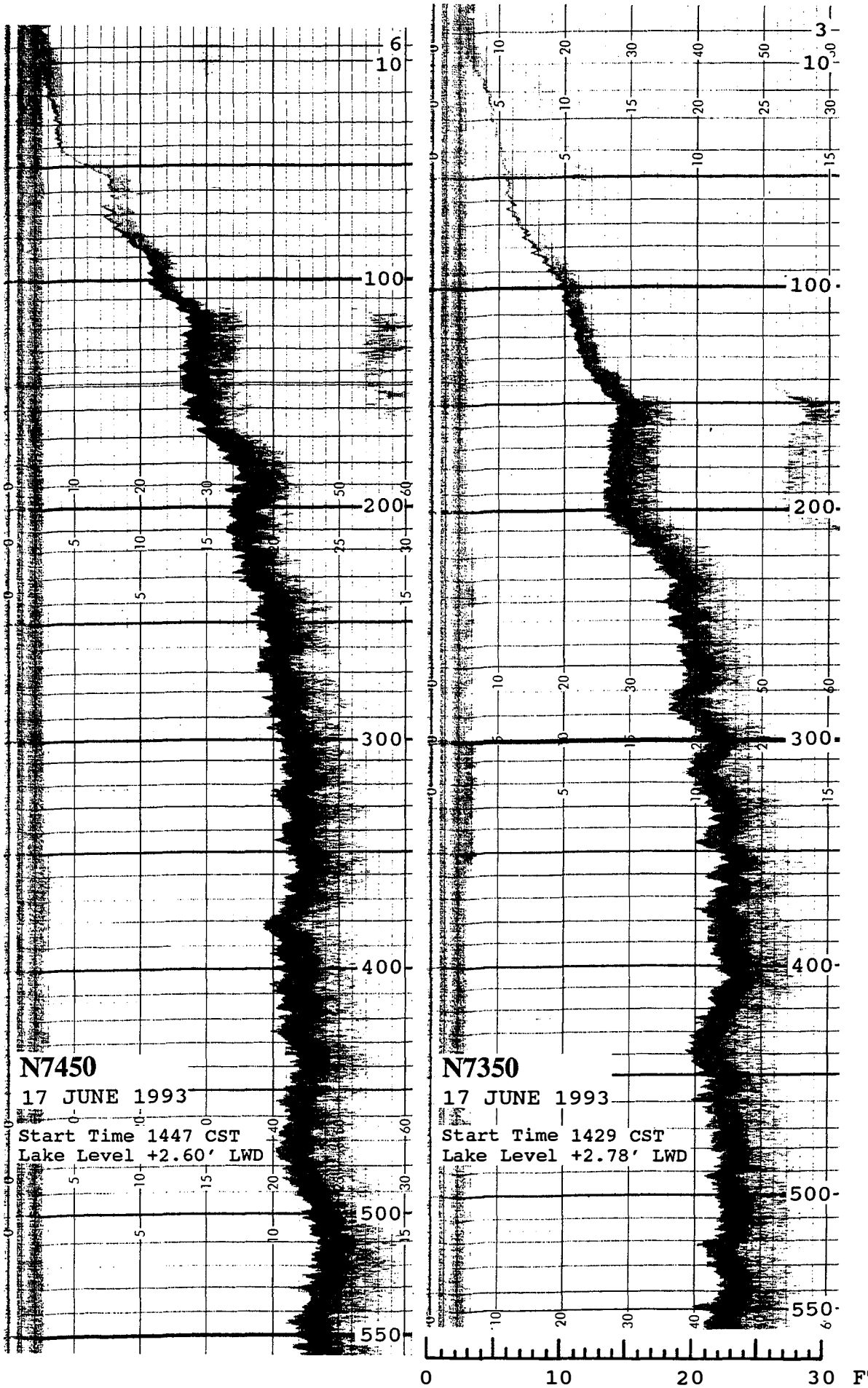

N9030
19 JUNE 1993
Start Time 1145 CST
Lake Level +2.88' LWD
N8830
19 JUNE 1993
Start Time 1127 CST
Lake Level +2.94' LWD
100
200
300
400
500
550
0
10
20
30 FT

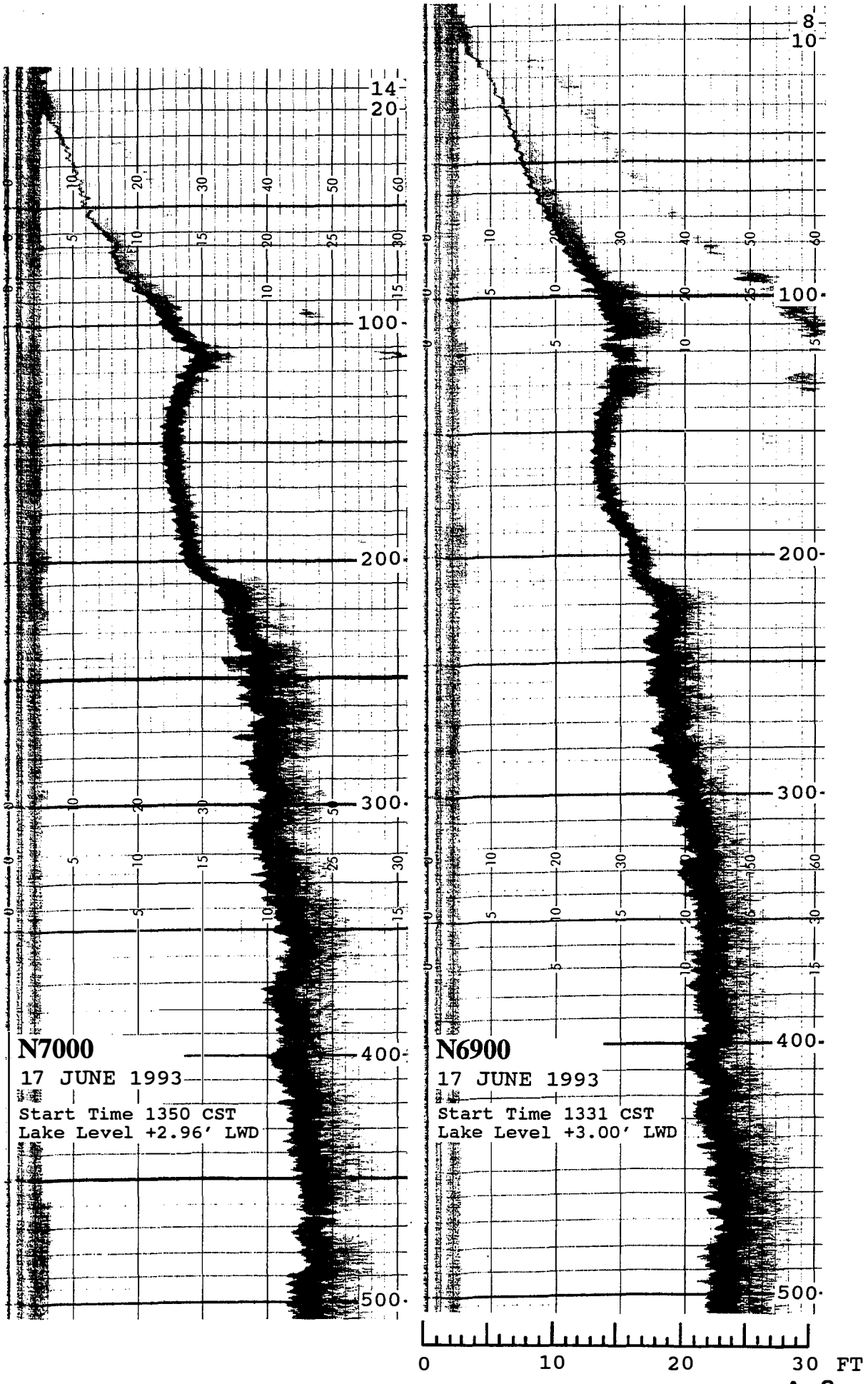

N8630
19 JUNE 1993
Start Time 1055 CST
Lake Level +3.00' LWD
N8430
18 JUNE 1993
Start Time 1214 CST
Lake Level +2.93' LWD
0
10
20
30 FT

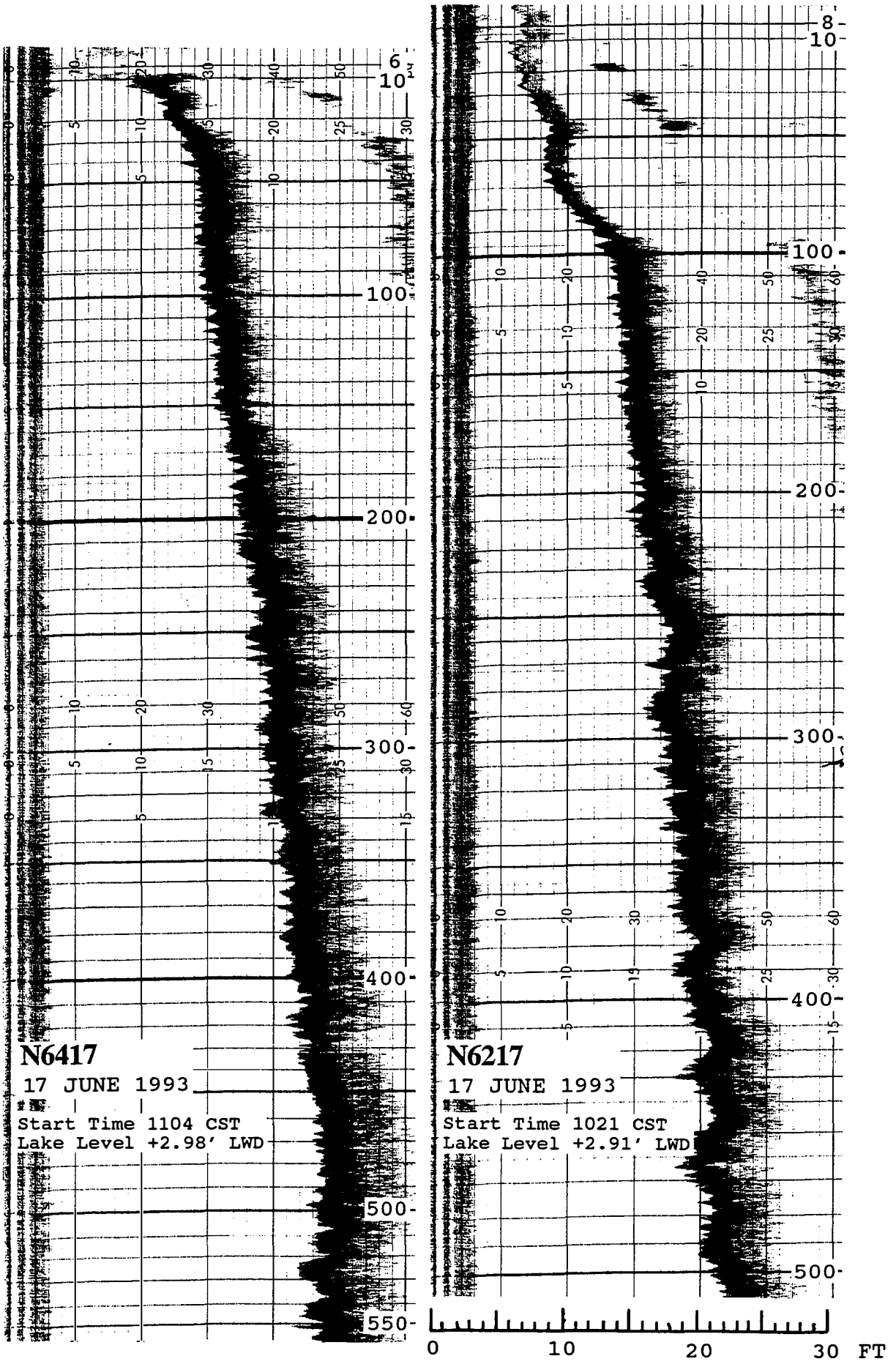

N8300
18 JUNE 1993
Start Time 1158 CST
Lake Level +2.93' LWD
N8230
18 JUNE 1993
Start Time 1112 CST
Lake Level +2.85' LWD
0
10
20
30 FT

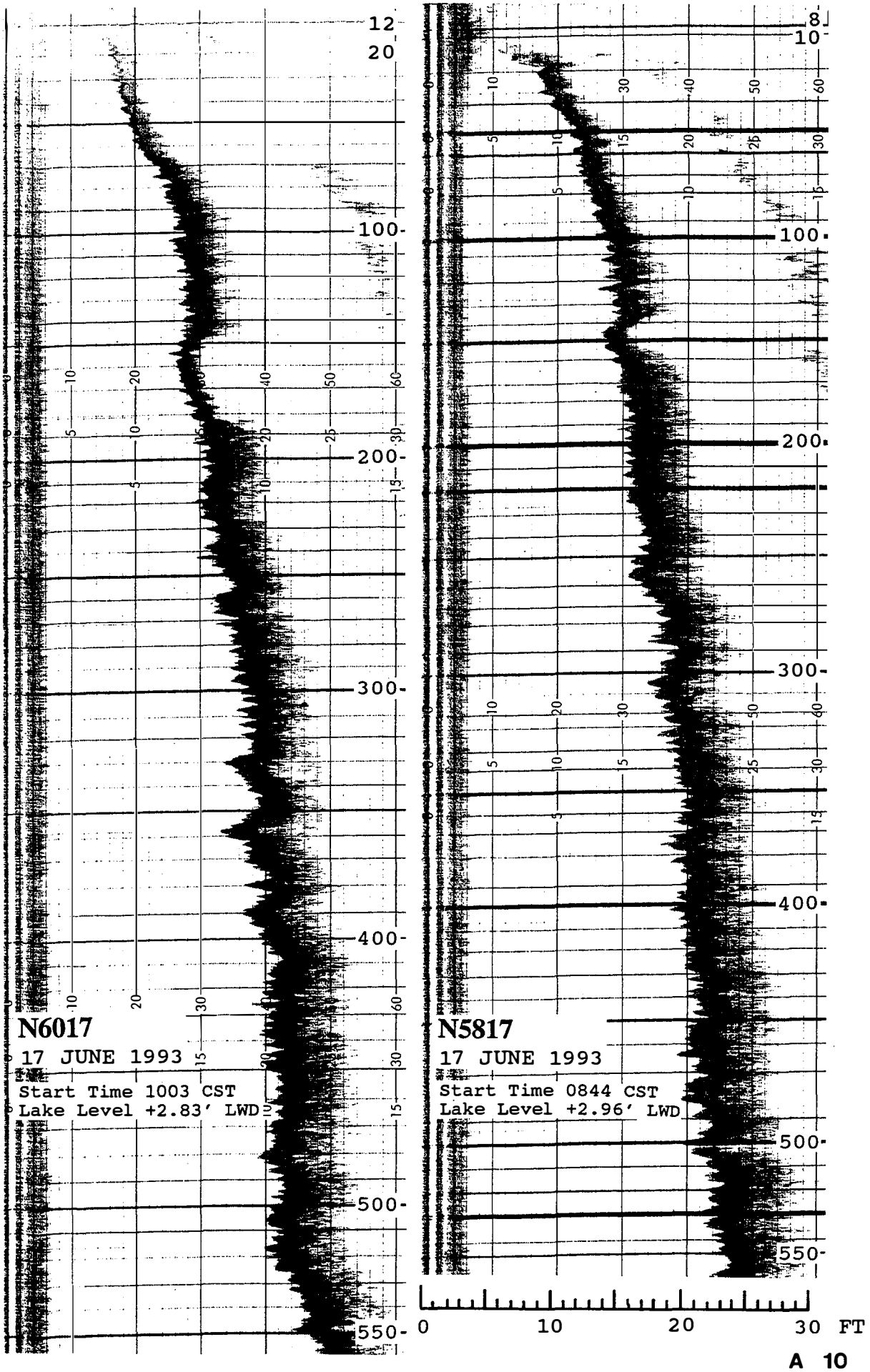

N8200
18 JUNE 1993
Start Time 1059 CST
Lake Level +2.81' LWD
N8030
18 JUNE 1993
Start Time 1020 CST
Lake Level +2.91' LWD
0
10
20
30 FT

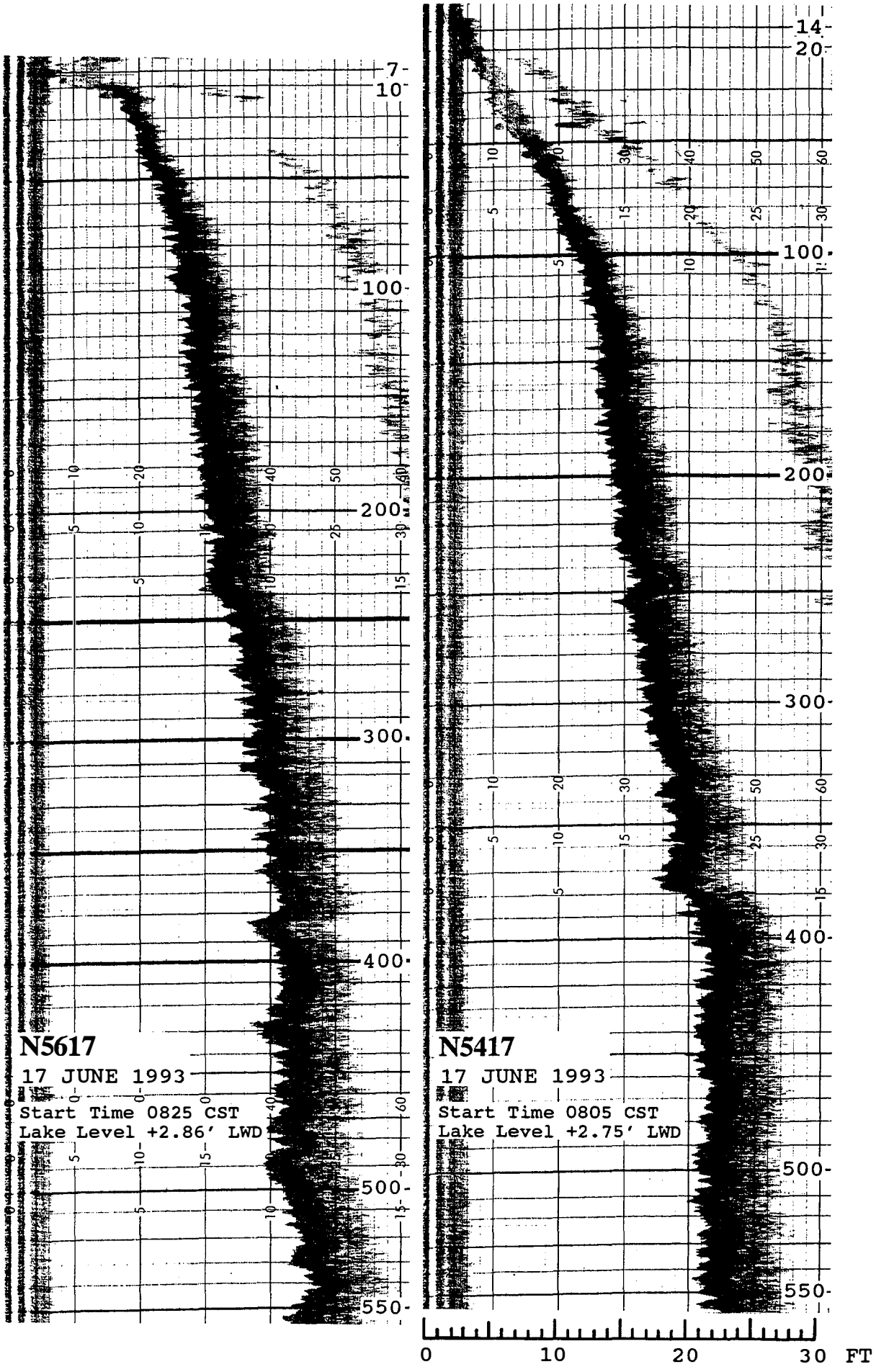

N7850
18 JUNE 1993
Start Time 1000 CST
Lake Level +3.01' LWD
N7750
18 JUNE 1993
Start Time 0945 CST
Lake Level +3.01' LWD
0
10
20
30 FT

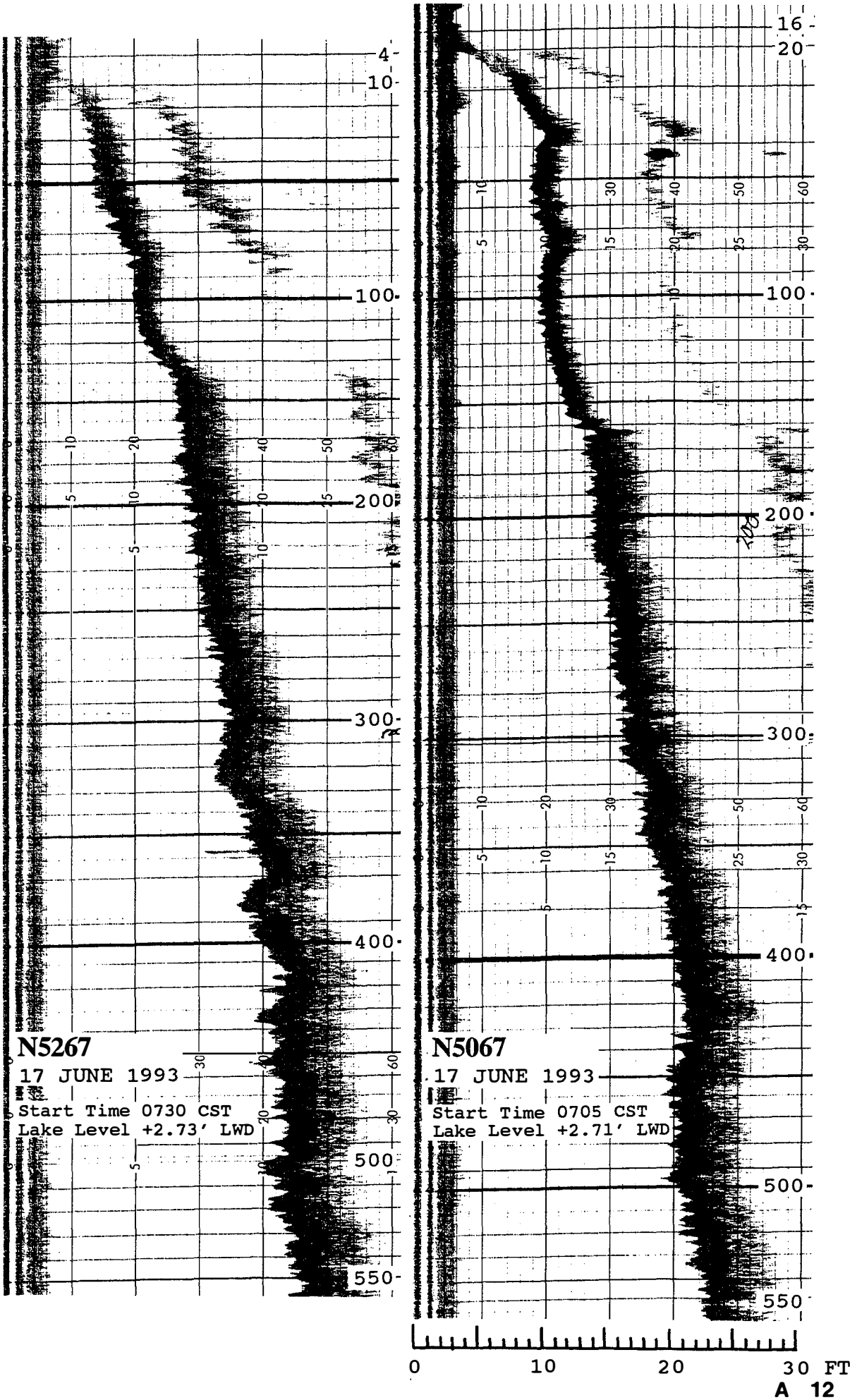

N7450
17 JUNE 1993
Start Time 1447 CST
Lake Level +2.60′ LWD
N7350
17 JUNE 1993
Start Time 1429 CST
Lake Level +2.78′ LWD
100
200
300
400
500
550
0
10
20
30 FT

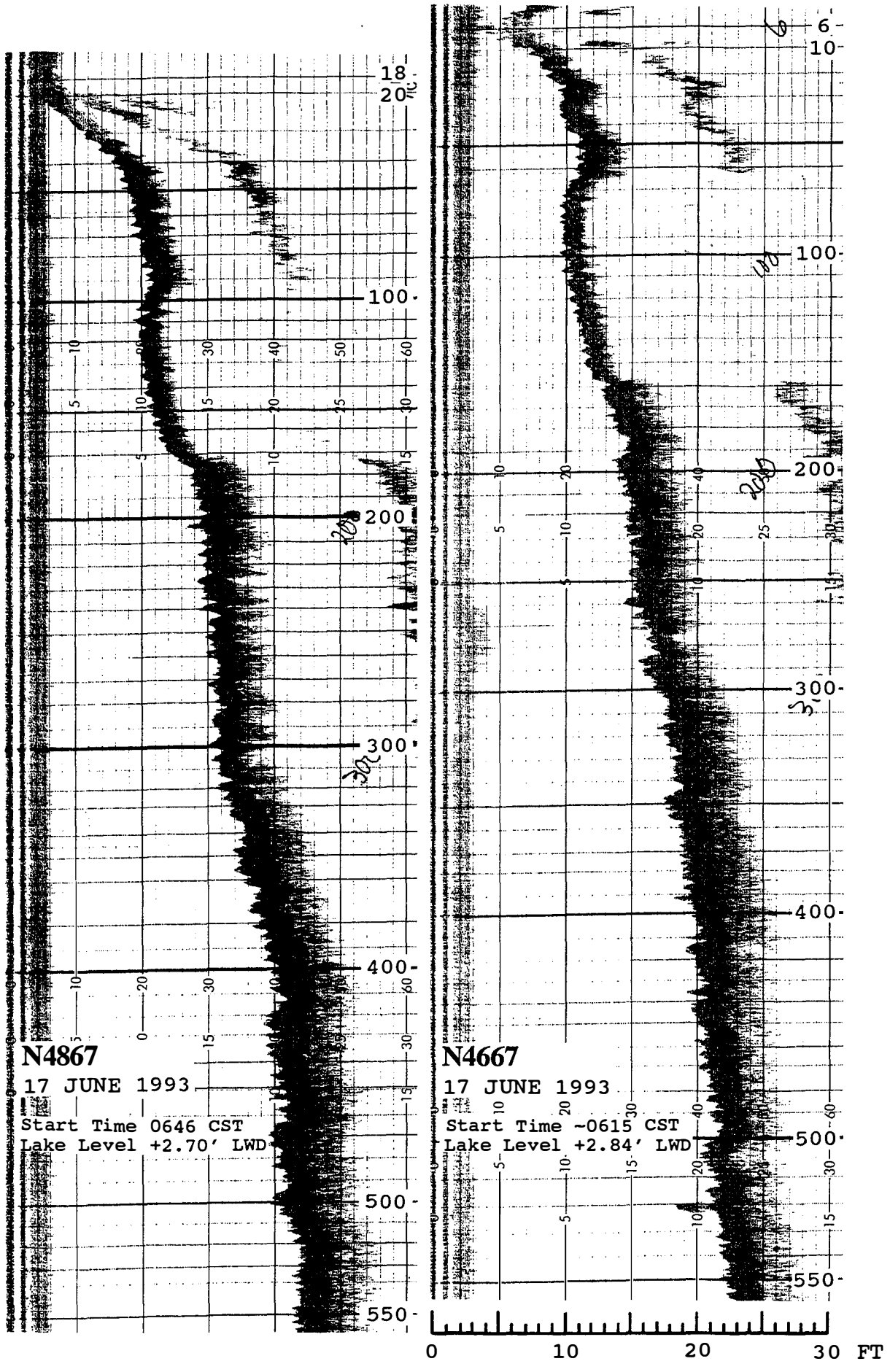

N7000
17 JUNE 1993
Start Time 1350 CST
Lake Level +2.96′ LWD
N6900
17 JUNE 1993
Start Time 1331 CST
Lake Level +3.00′ LWD
0
10
20
30 FT

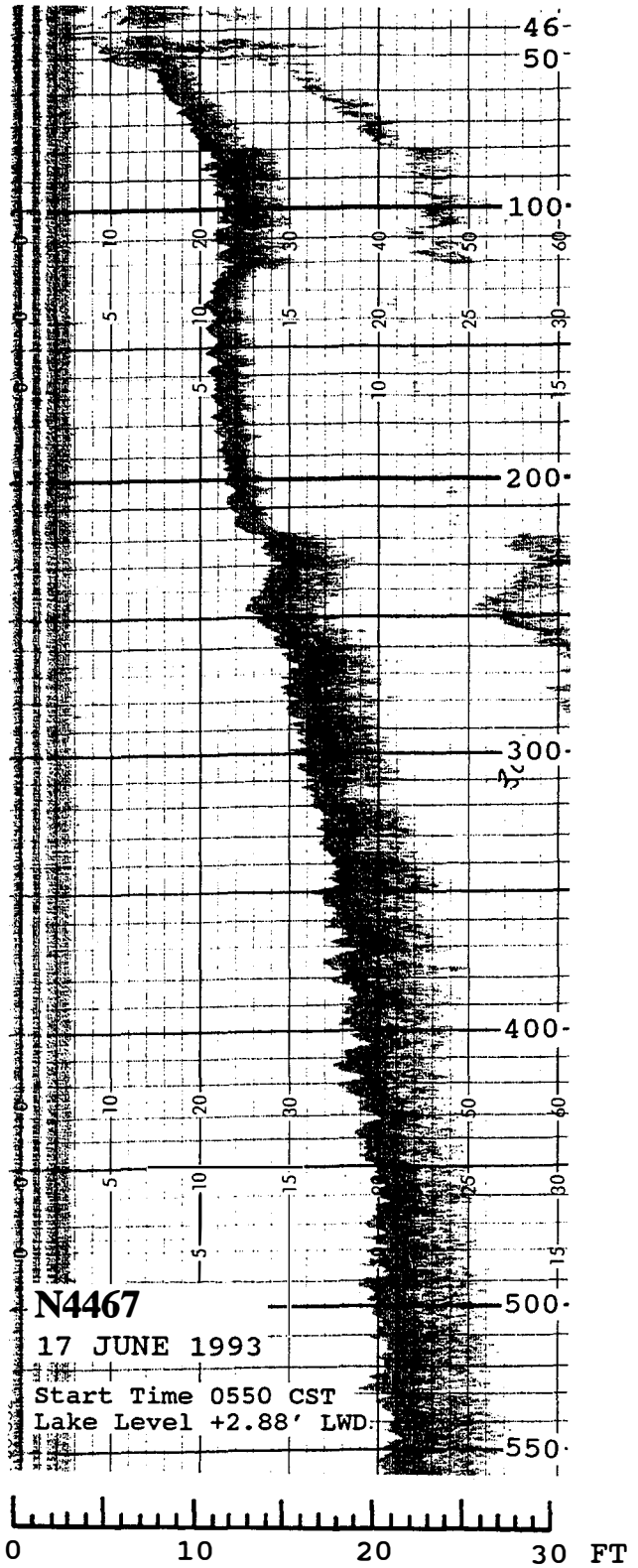

N6417
17 JUNE 1993
Start Time 1104 CST
Lake Level +2.98' LWD
N6217
17 JUNE 1993
Start Time 1021 CST
Lake Level +2.91' LWD
0
10
20
30 FT


N6017
17 JUNE 1993
Start Time 1003 CST
Lake Level +2.83′ LWD
N5817
17 JUNE 1993
Start Time 0844 CST
Lake Level +2.96′ LWD
0
10
20
30 FT


N5617
17 JUNE 1993
Start Time 0825 CST
Lake Level +2.86′ LWD
N5417
17 JUNE 1993
Start Time 0805 CST
Lake Level +2.75′ LWD
0
10
20
30 FT


N5267
17 JUNE 1993
Start Time 0730 CST
Lake Level +2.73′ LWD
N5067
17 JUNE 1993
Start Time 0705 CST
Lake Level +2.71′ LWD
0
10
20
30 FT


N4867
17 JUNE 1993
Start Time 0646 CST
Lake Level +2.70' LWD
N4667
17 JUNE 1993
Start Time ~0615 CST
Lake Level +2.84' LWD
0
10
20
30 FT


46
50
100
200
300
400
500
550
N4467
17 JUNE 1993
Start Time 0550 CST
Lake Level +2.88' LWD
0
10
20
30 FT

APPENDIX B

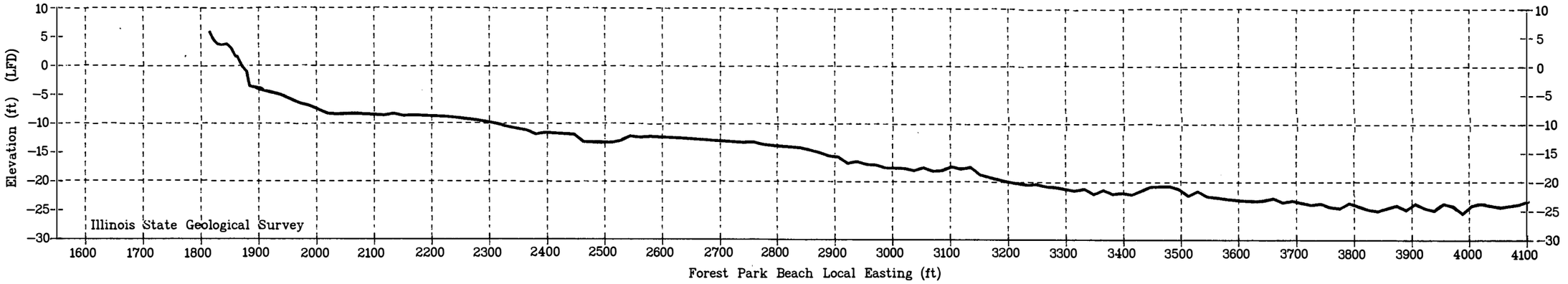
ISGS June 1993 Long Profiles

EXPLANATION

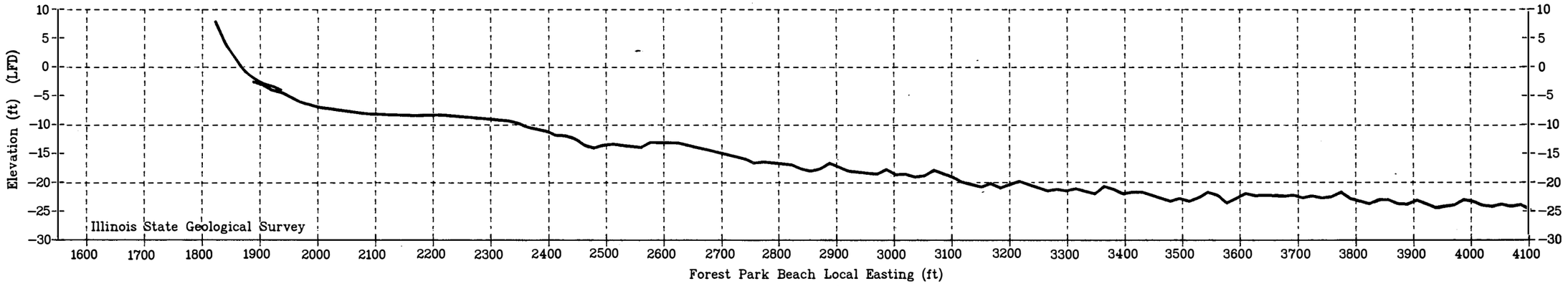
Dates on profiles are for the fathometer profiling. The prism-pole profiling across the beach and shallow nearshore was done within one day before or after the fathometer profiling.

Elevations are referenced to Lake Forest Datum (LFD). Vertical exaggeration for all profiles is 10x.

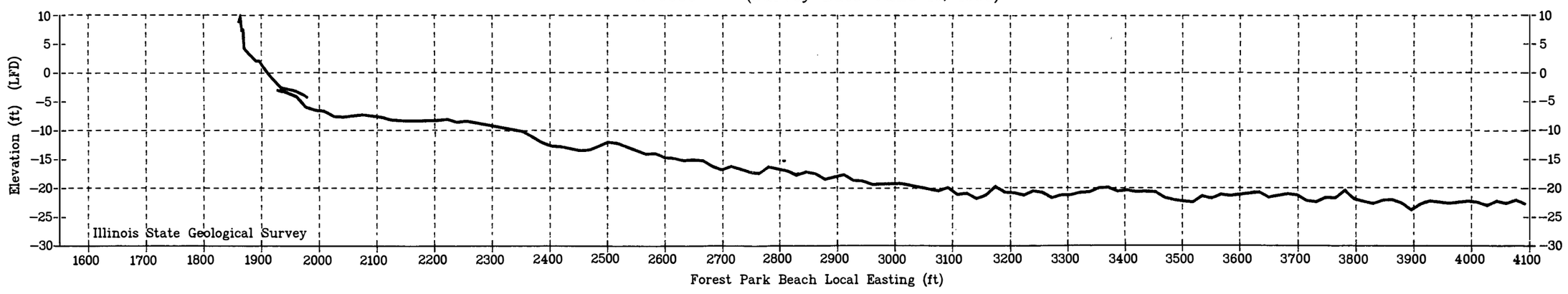
N 9430 (Survey Date: June 19, 1993)



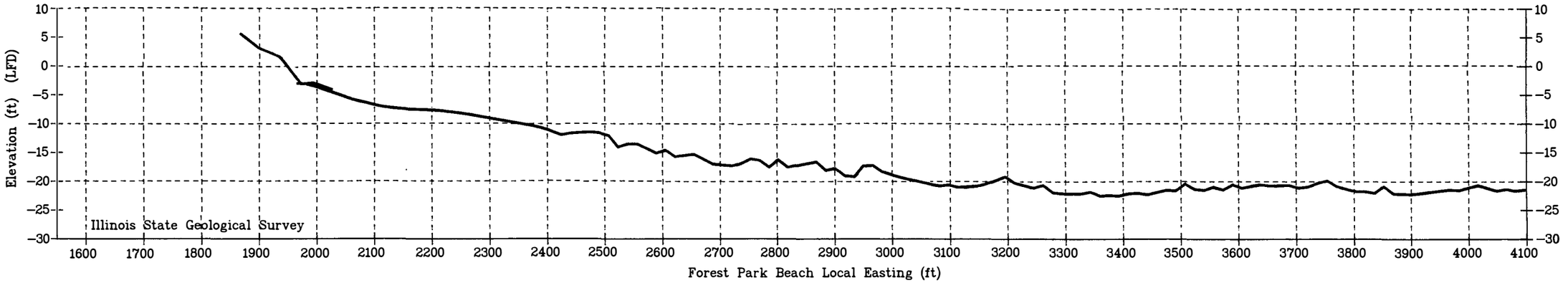
N 9230 (Survey Date: June 19, 1993)



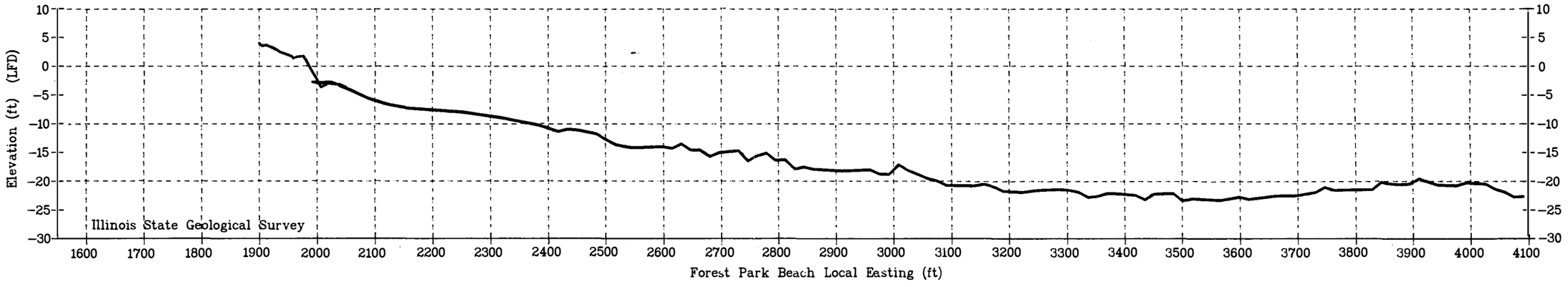
N 9030 (Survey Date: June 19, 1993)



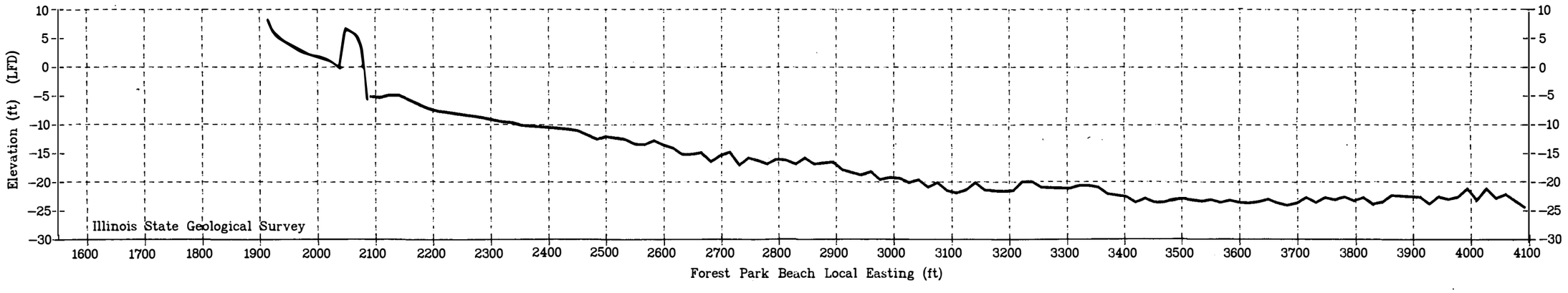
N 8830 (Survey Date: June 19, 1993)



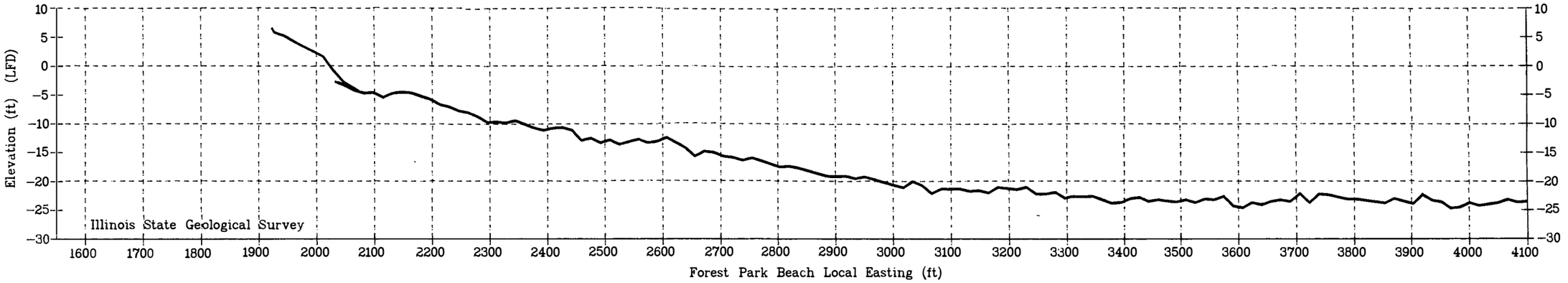
N 8630 (Survey Date: June 19, 1993)



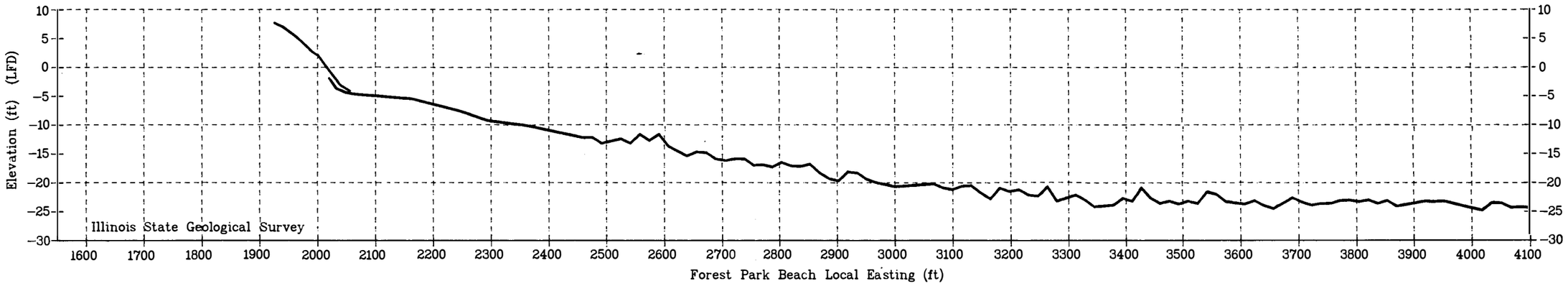
N 8430 (Survey Date: June 18, 1993)



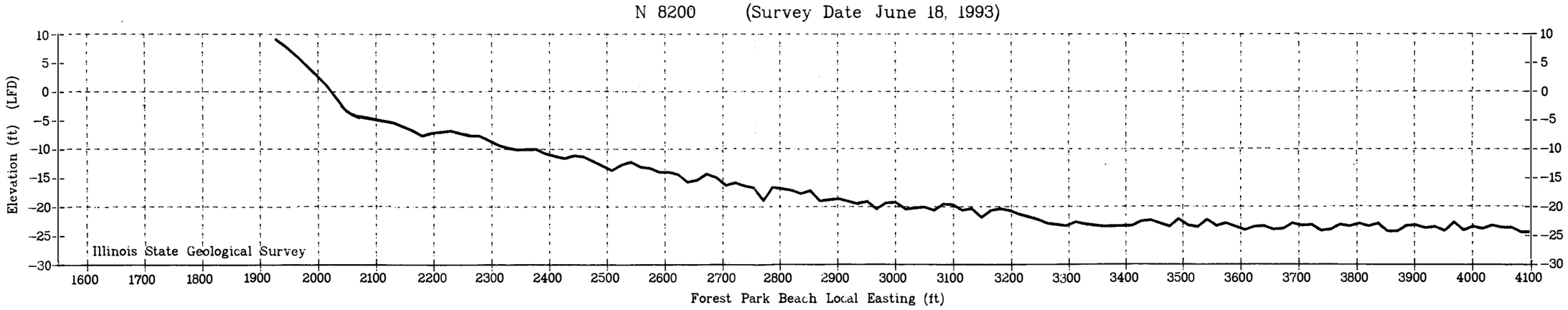
N 8300 (Survey Date June 18, 1993)



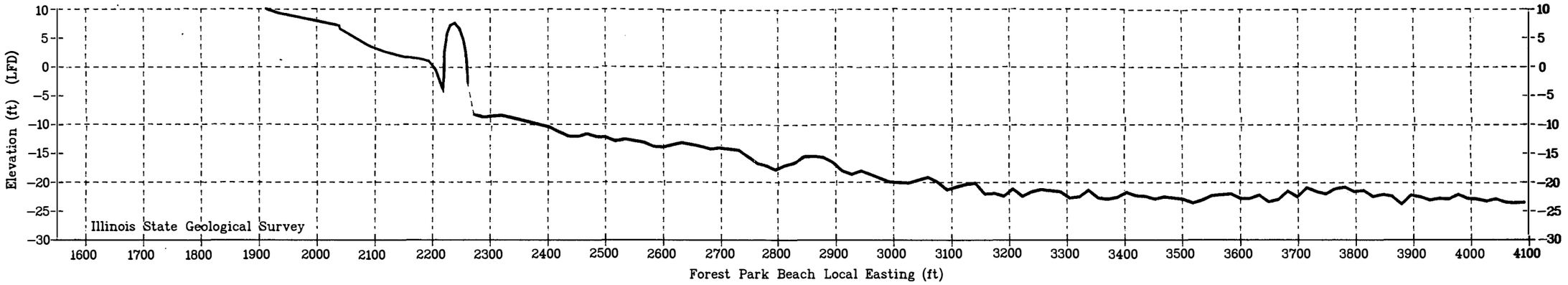
N 8230 (Survey Date June 18, 1993)



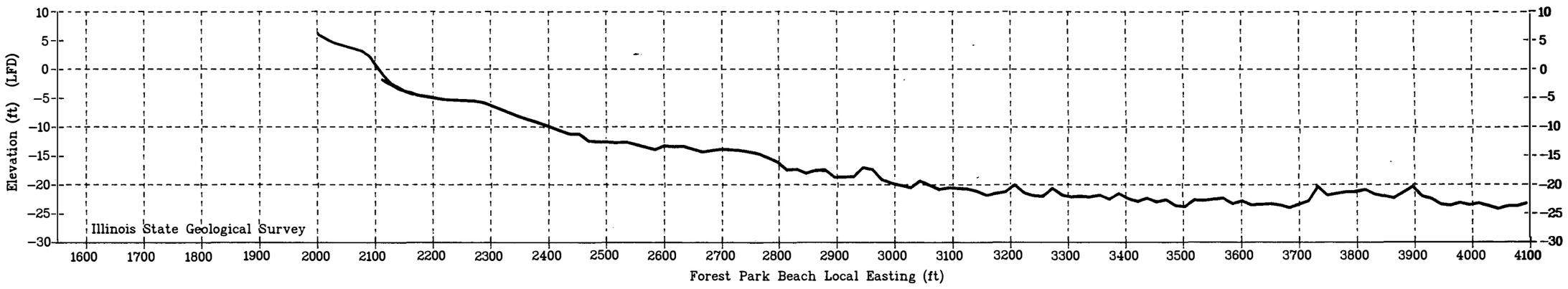
N 8200 (Survey Date June 18, 1993)



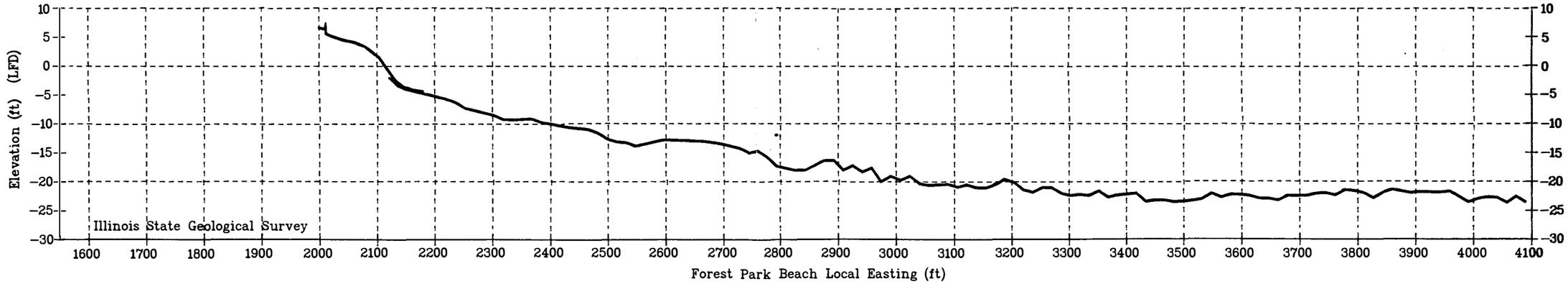
N 8030 (Survey Date: June 18, 1993)



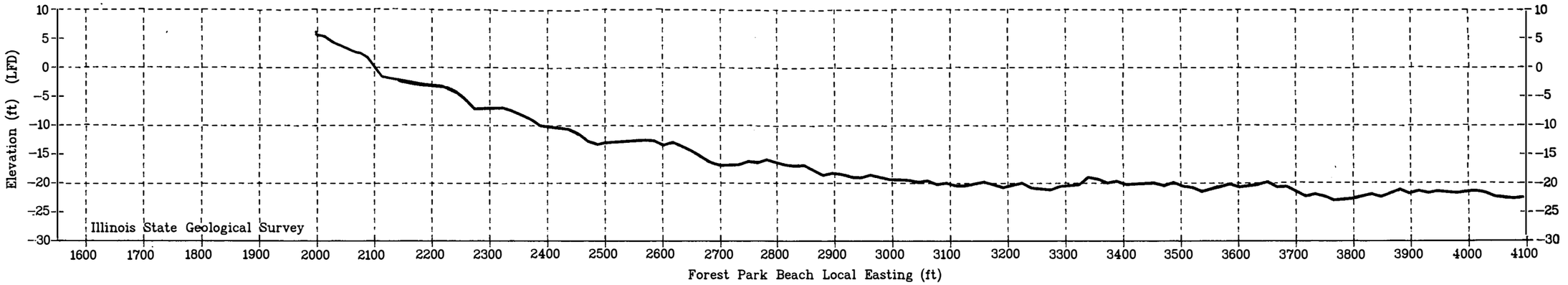
N 7850 (Survey Date: June 18, 1993)



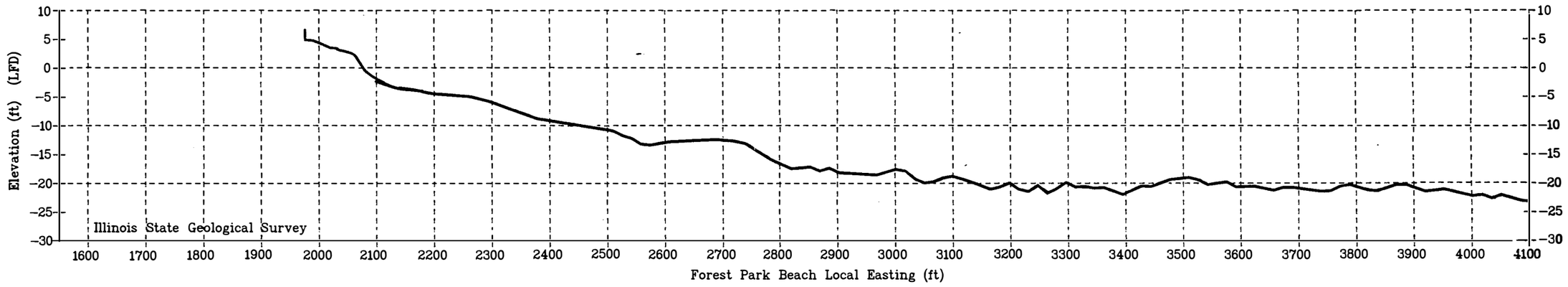
N 7750 (Survey Date: June 18, 1993)



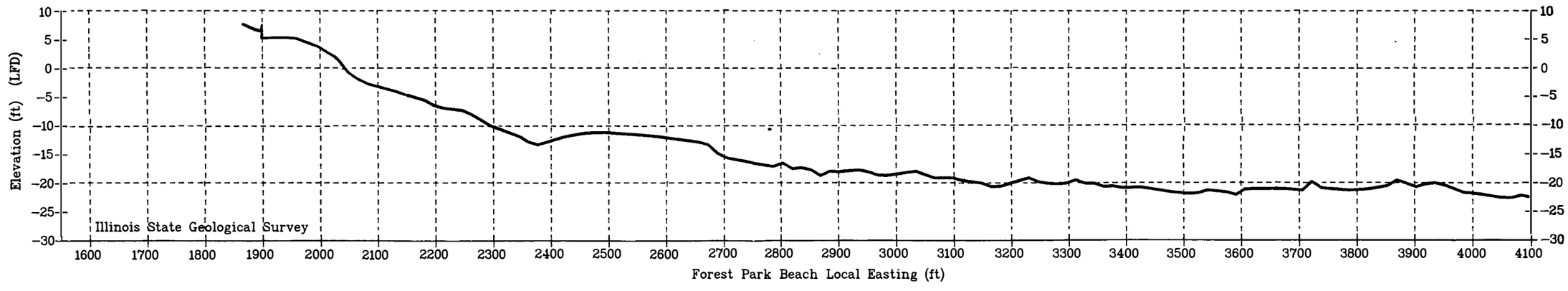
N 7450 (Survey Date: June 17, 1993)



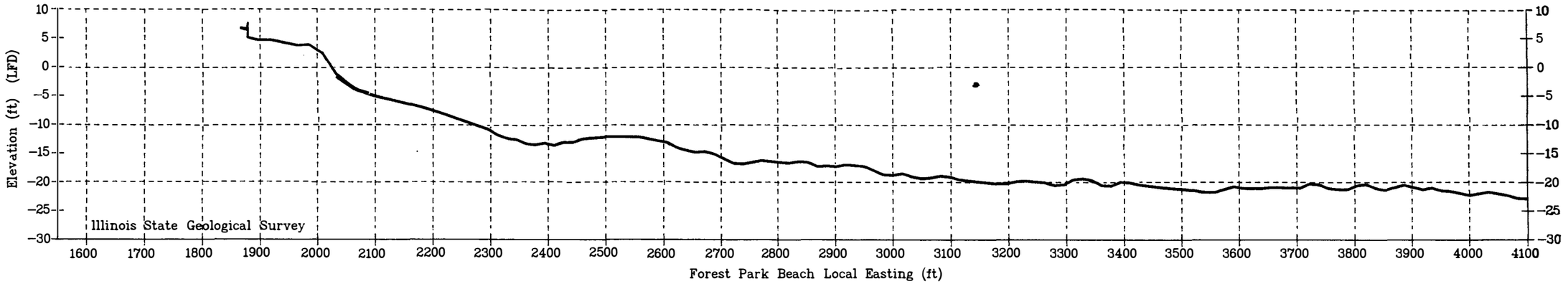
N 7350 (Survey Date: June 17, 1993)



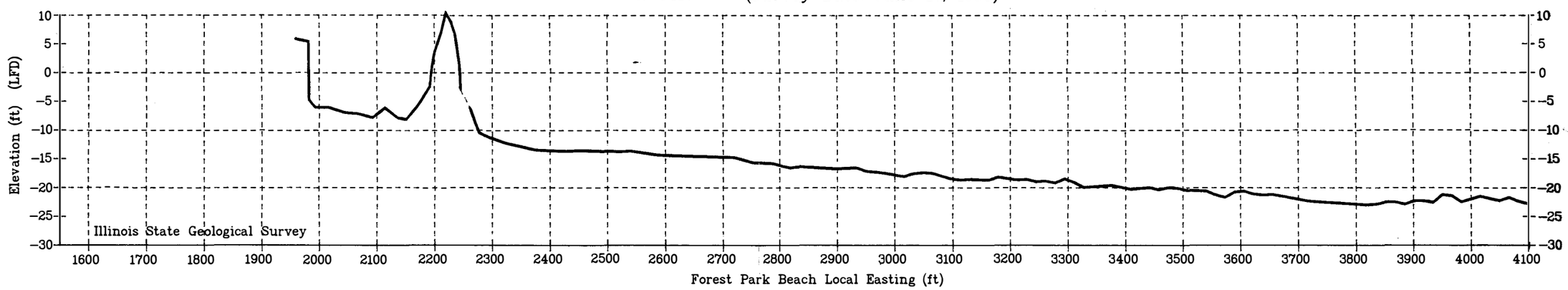
N 7000 (Survey Date: June 17, 1993)



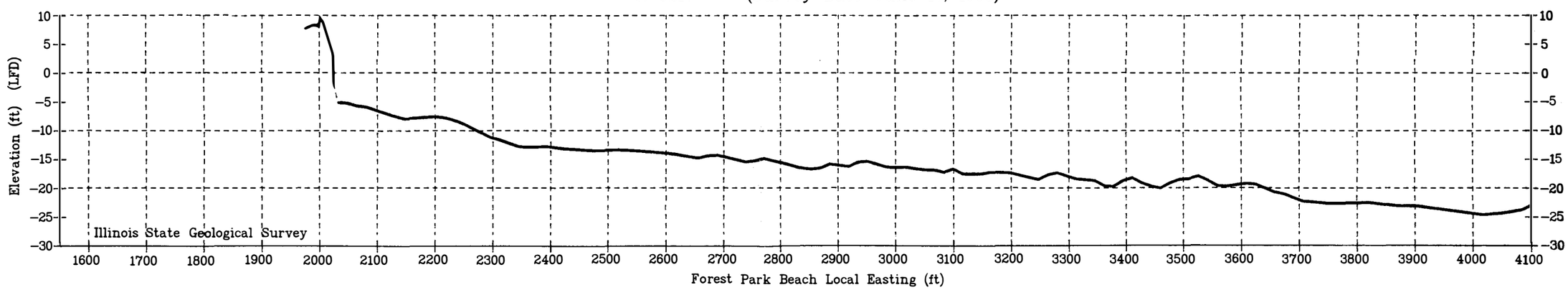
N 6900 (Survey Date: June 17, 1993)



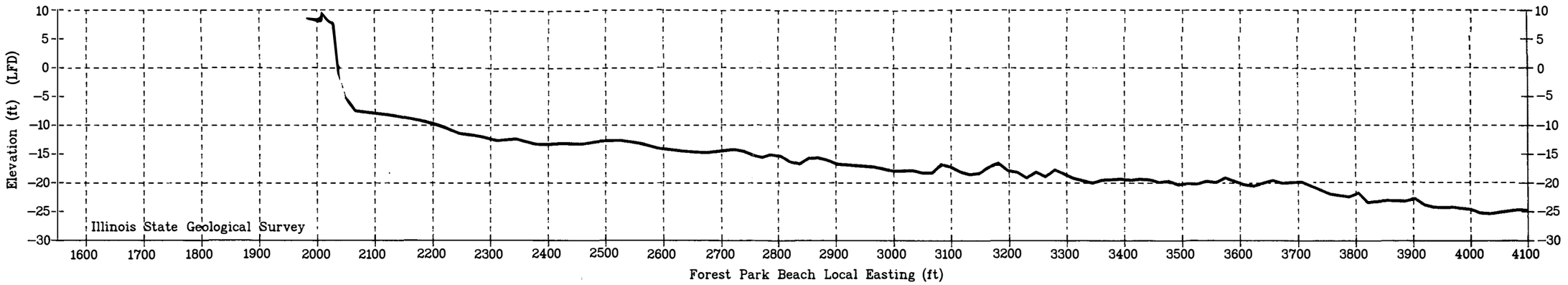
N 6417 (Survey Date: June 17, 1993)



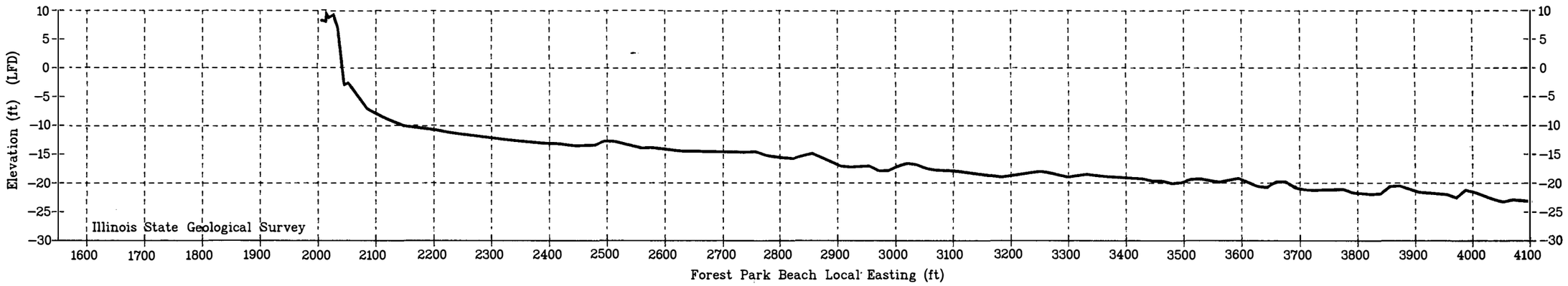
N 6217 (Survey Date: June 17, 1993)



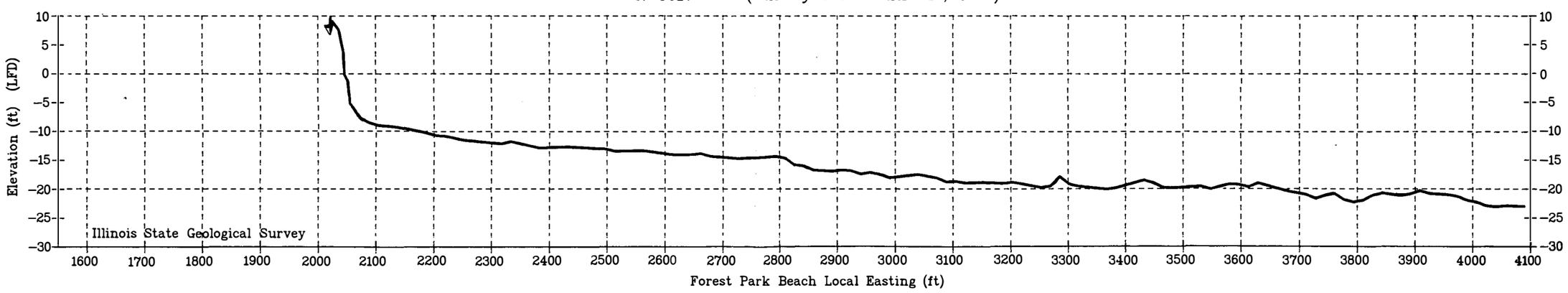
N 6017 (Survey Date: June 17, 1993)



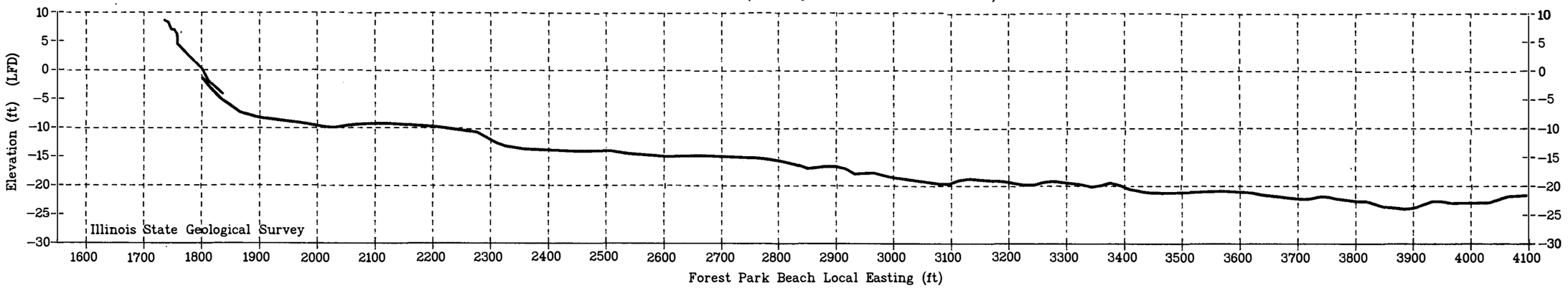
N 5817 (Survey Date: June 17, 1993)



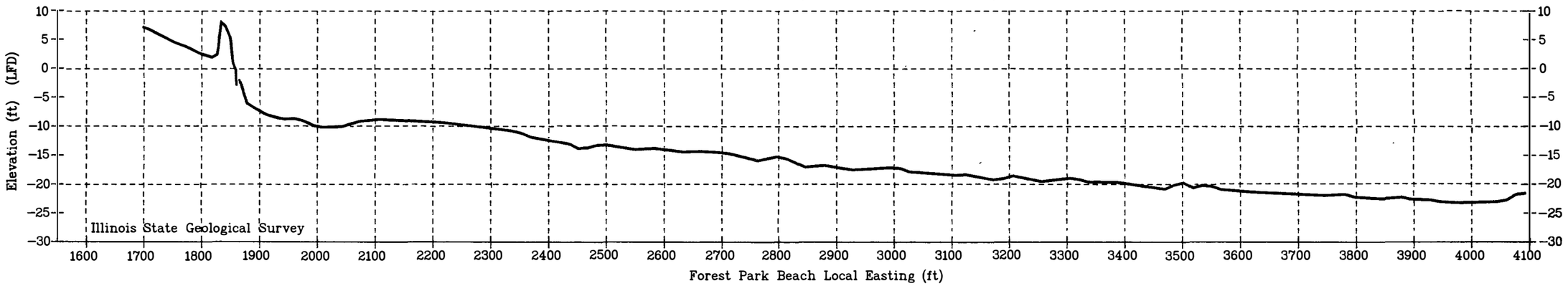
N 5617 (Survey Date: June 17, 1993)



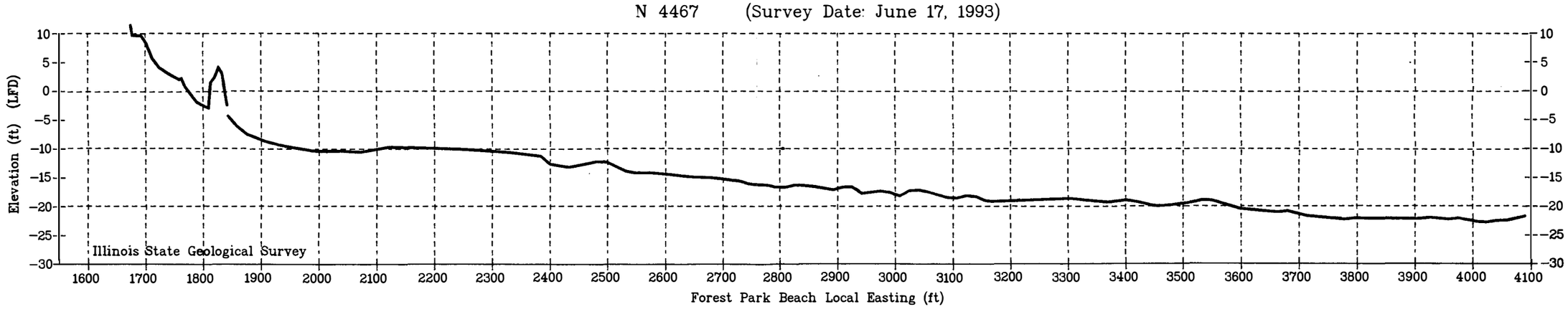
N 4867 (Survey Date: June 17, 1993)



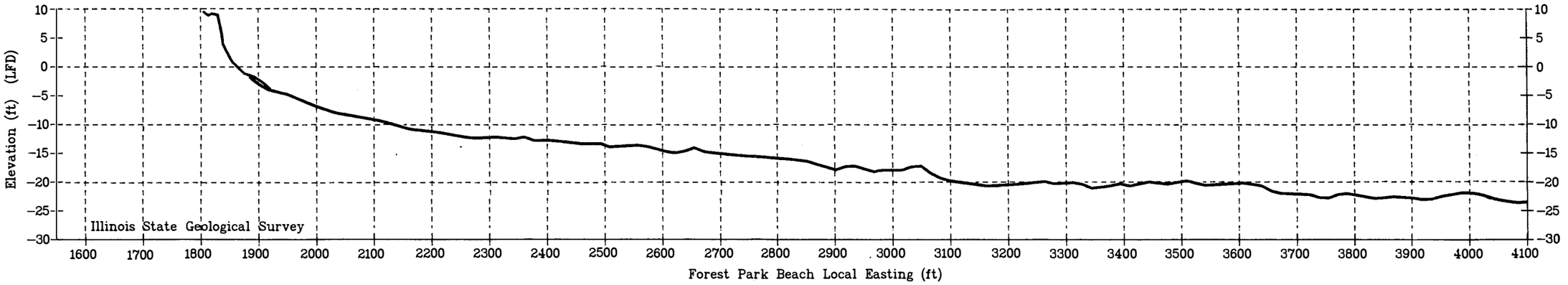
N 4667 (Survey Date: June 17, 1993)



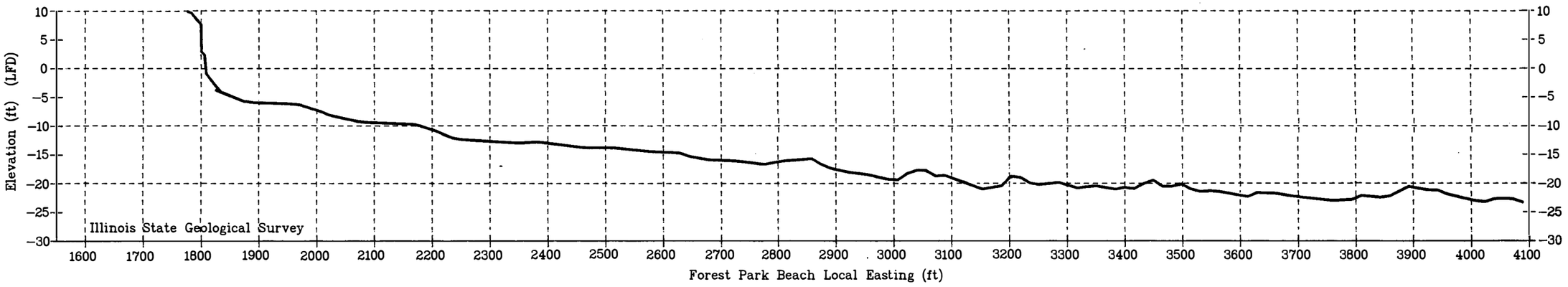
N 4467 (Survey Date: June 17, 1993)



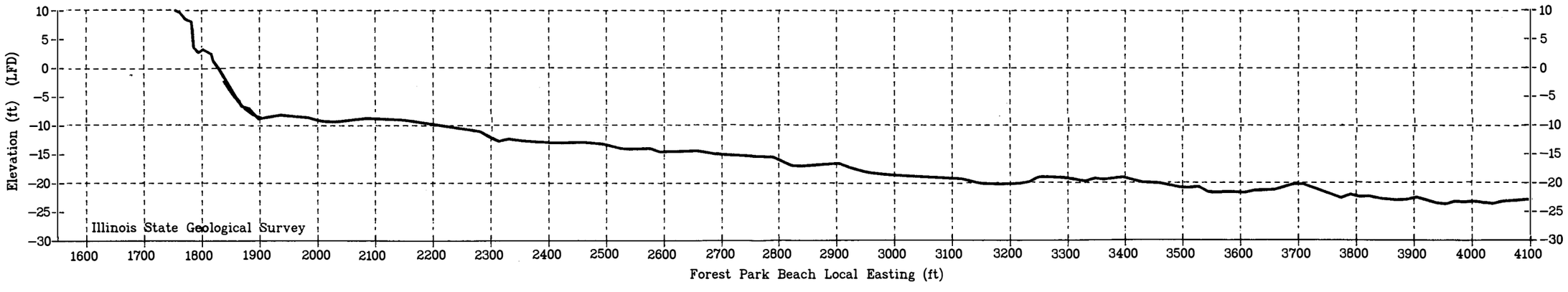
N 5417 (Survey Date: June 17, 1993)



N 5267 (Survey Date: June 17, 1993)



N 5067 (Survey Date: June 17, 1993)



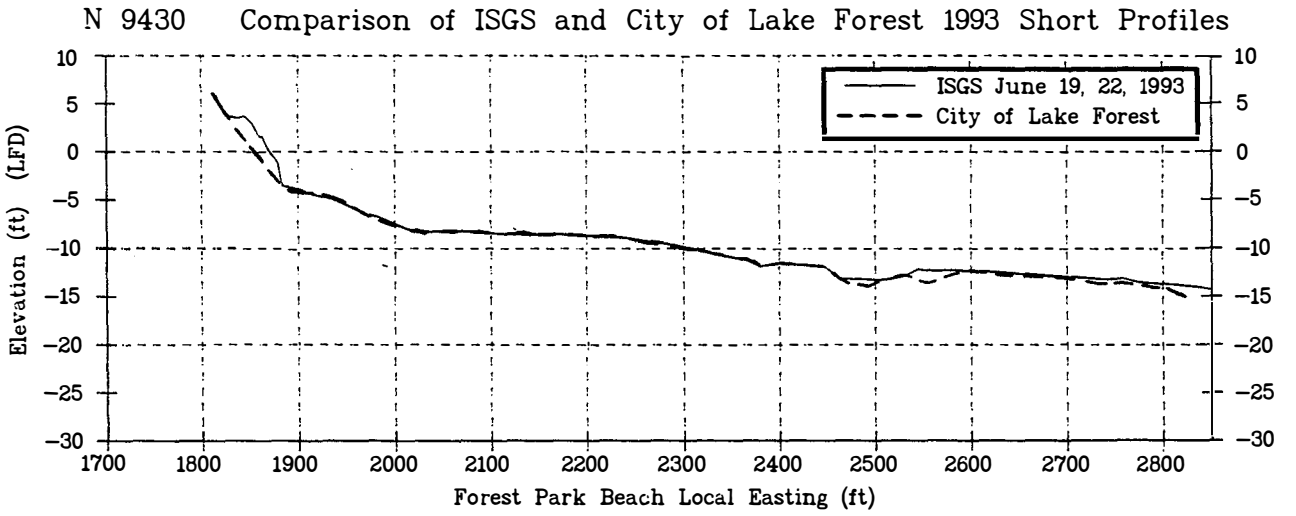
APPENDIX C

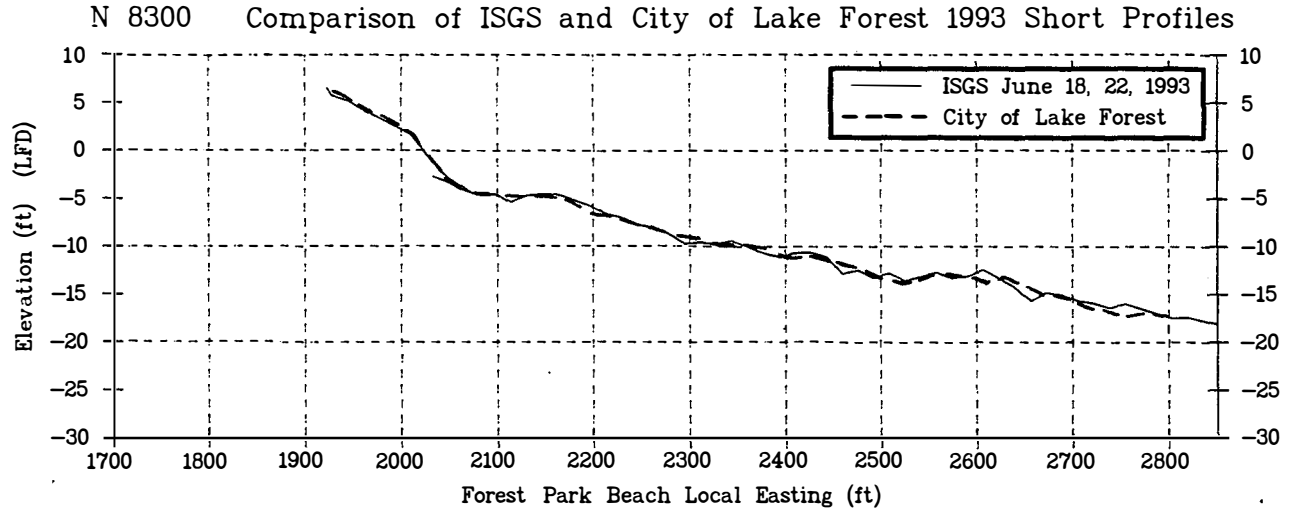
Comparison of
ISGS and City of Lake Forest
1993 Beach and Nearshore (Short) Profiles

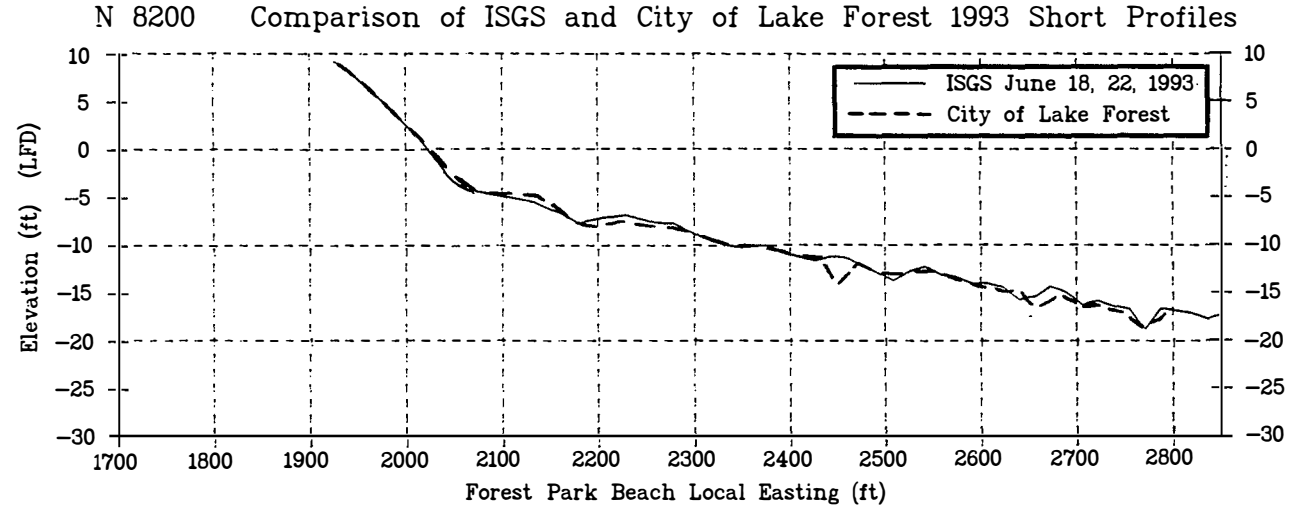
EXPLANATION

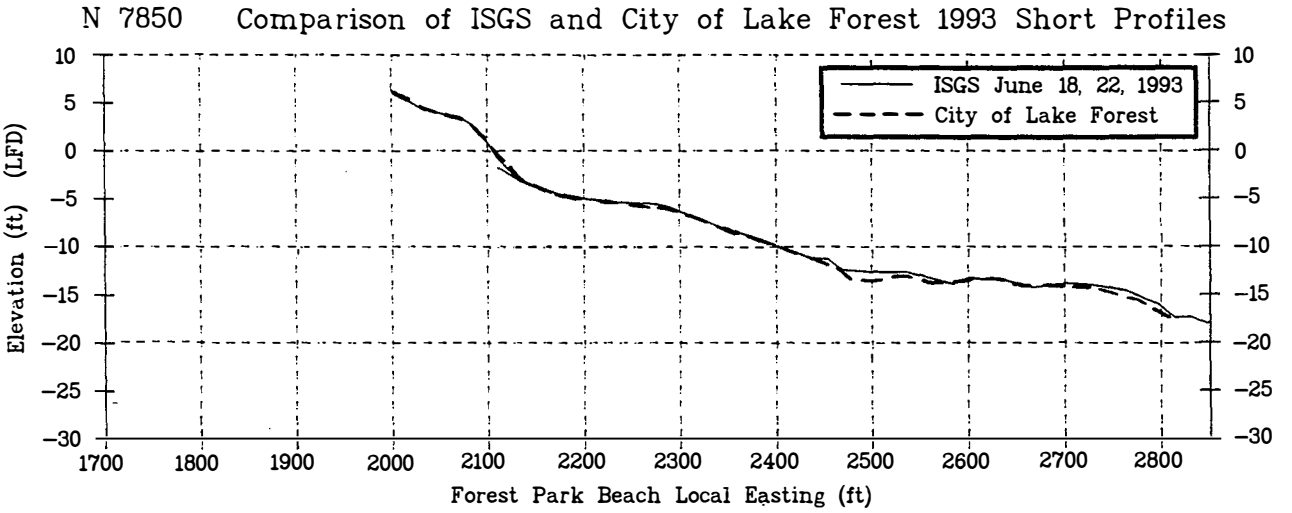
These profiles compare the 1993 short profile data collected by the ISGS that duplicated lines run by the City of Lake Forest. All City of Lake Forest data were collected with prism pole and total station. ISGS data were collected with prism pole and total station to a depth of about 5 ft LFD. Beyond this depth ISGS data are from fathometer records. In terms of vertical accuracy, the City of Lake Forest prism-pole data take precedent over ISGS fathometer data.

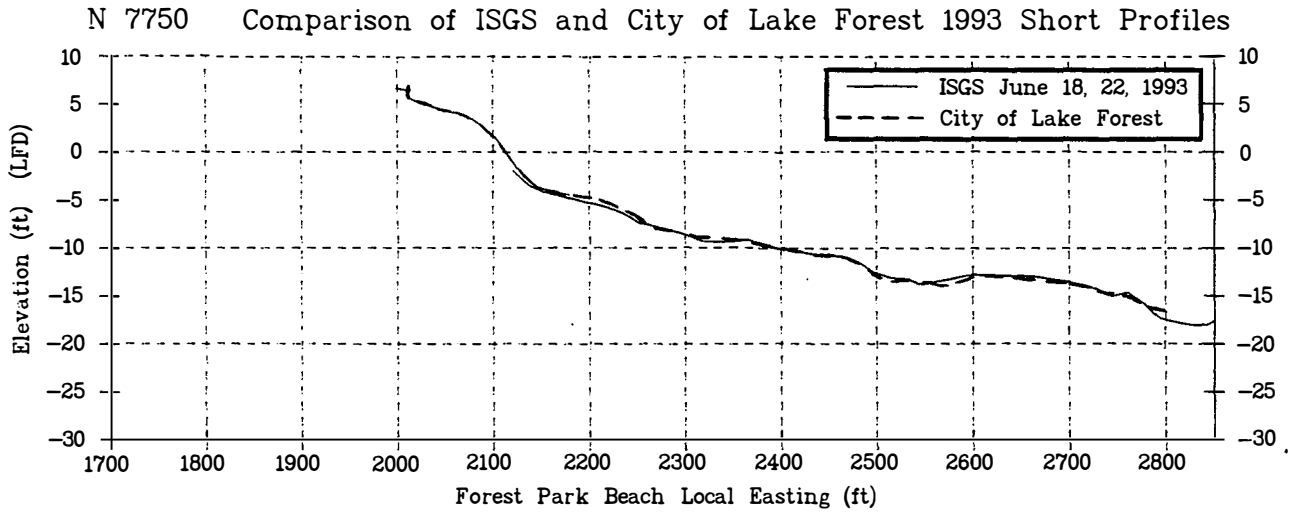
Elevations are referenced to Lake Forest Datum (LFD). Vertical exaggeration for all profiles is 10x.

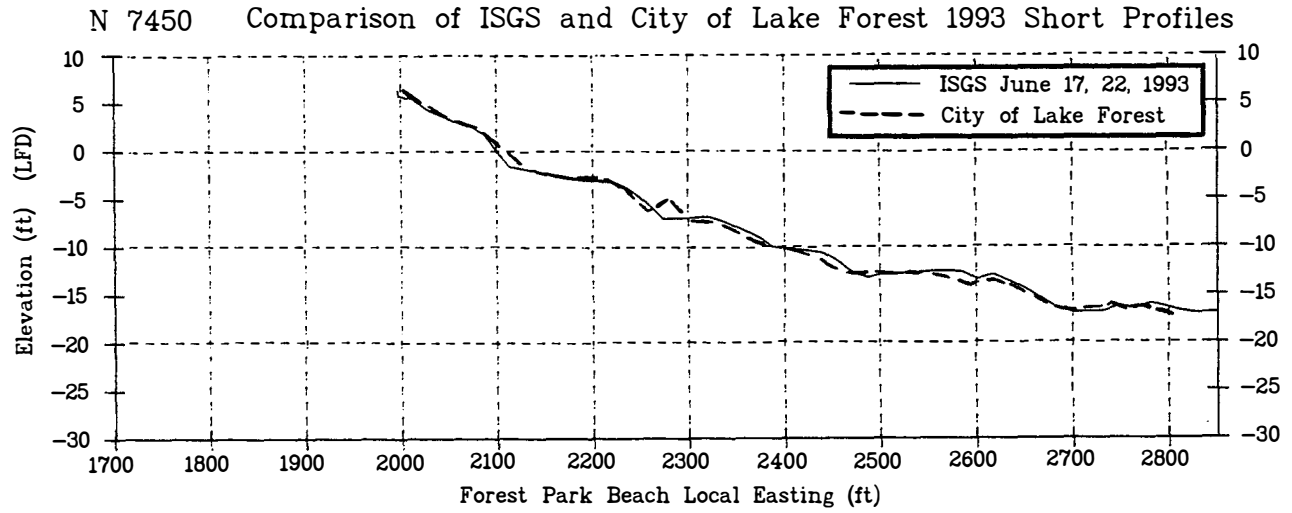

N 9430 Comparison of ISGS and City of Lake Forest 1993 Short Profiles
ISGS June 19, 22, 1993
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
-5
-10
-15
-20
-25
-30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800

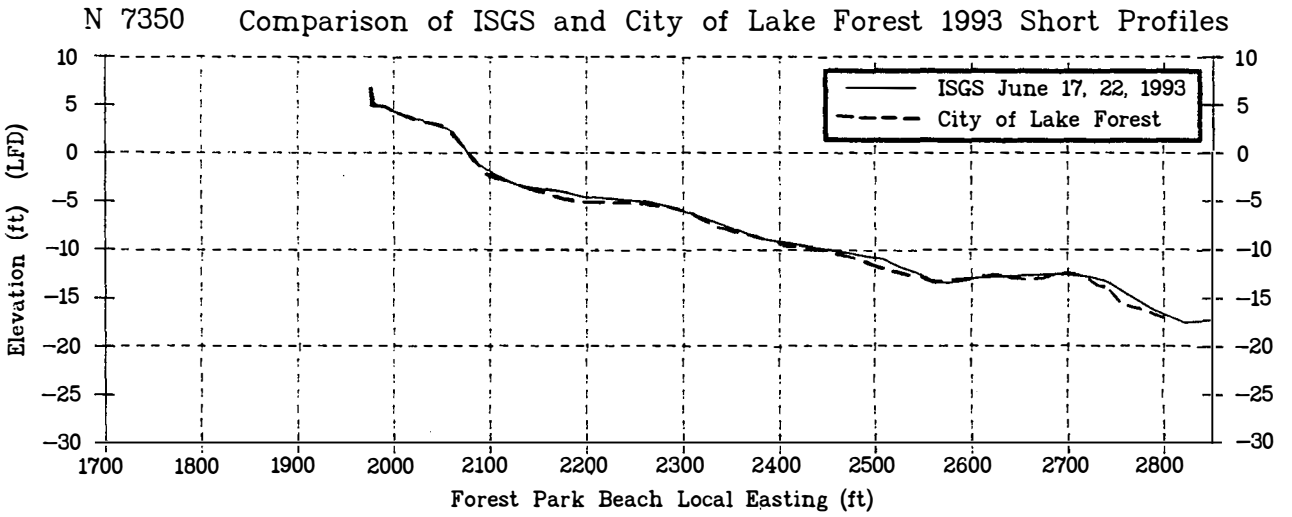

N 8300 Comparison of ISGS and City of Lake Forest 1993 Short Profiles
ISGS June 18, 22, 1993
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
-5
-10
-15
-20
-25
-30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800

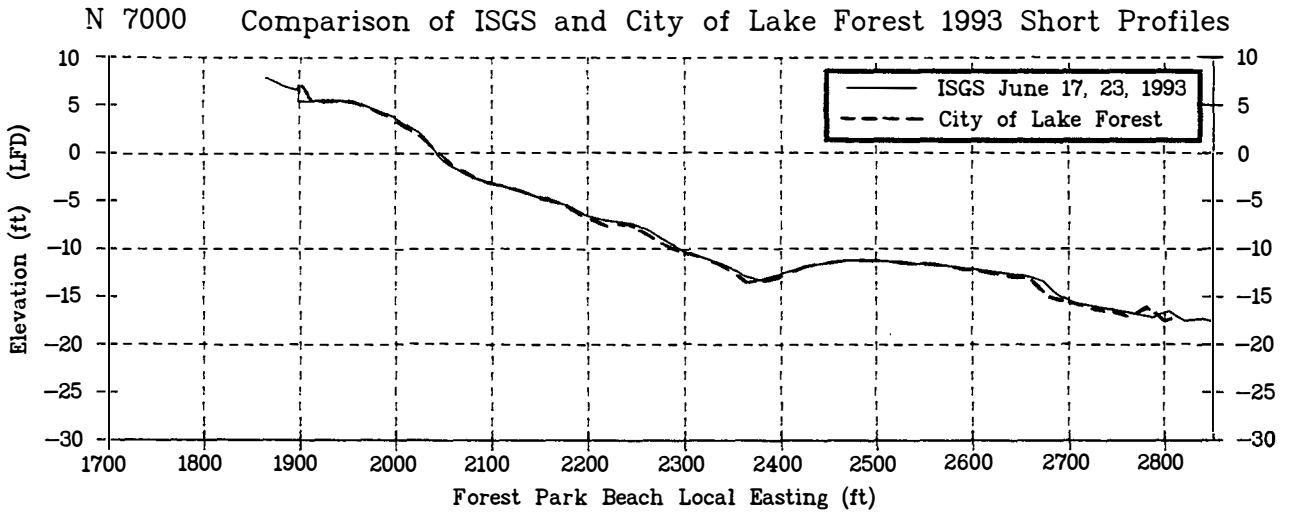

N 8200 Comparison of ISGS and City of Lake Forest 1993 Short Profiles
ISGS June 18, 22, 1993
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
-5
-10
-15
-20
-25
-30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800

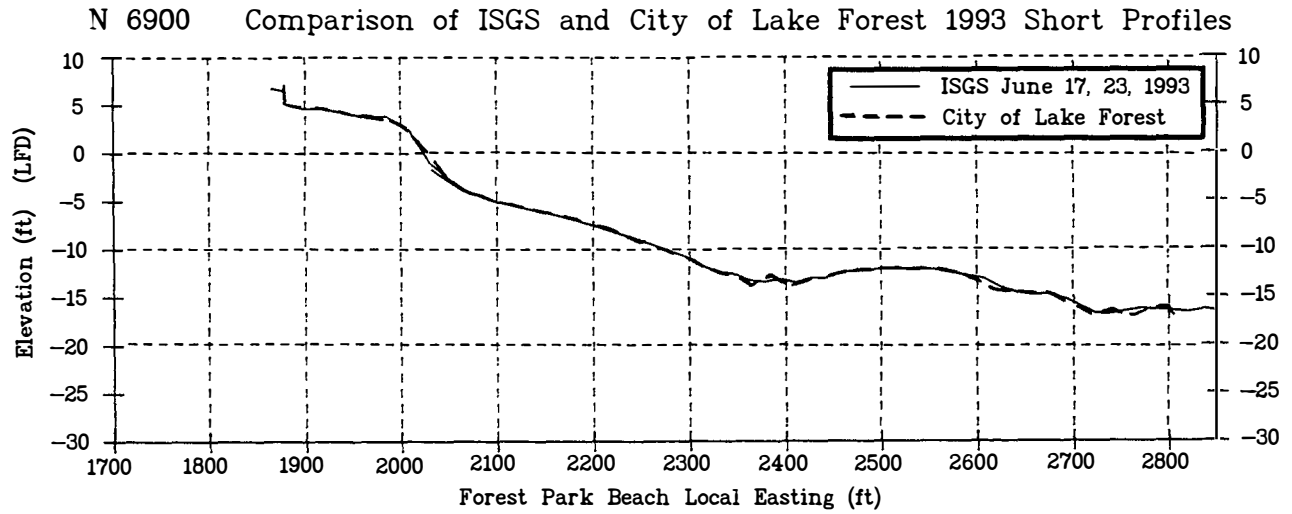

N 7850 Comparison of ISGS and City of Lake Forest 1993 Short Profiles
ISGS June 18, 22, 1993
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)


N 7750 Comparison of ISGS and City of Lake Forest 1993 Short Profiles
ISGS June 18, 22, 1993
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

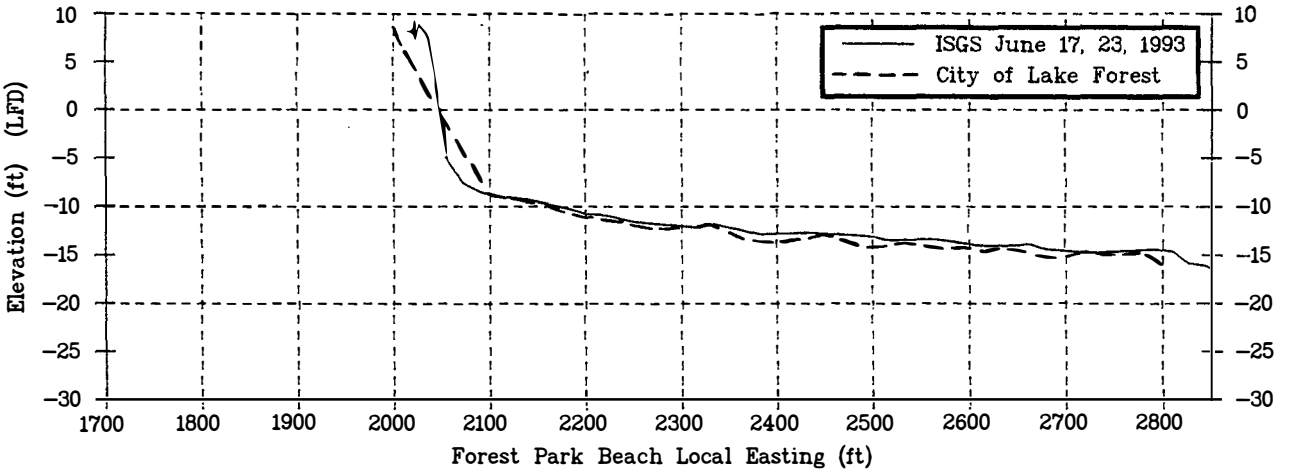

N 7450 Comparison of ISGS and City of Lake Forest 1993 Short Profiles
ISGS June 17, 22, 1993
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)


N 7350 Comparison of ISGS and City of Lake Forest 1993 Short Profiles
ISGS June 17, 22, 1993
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

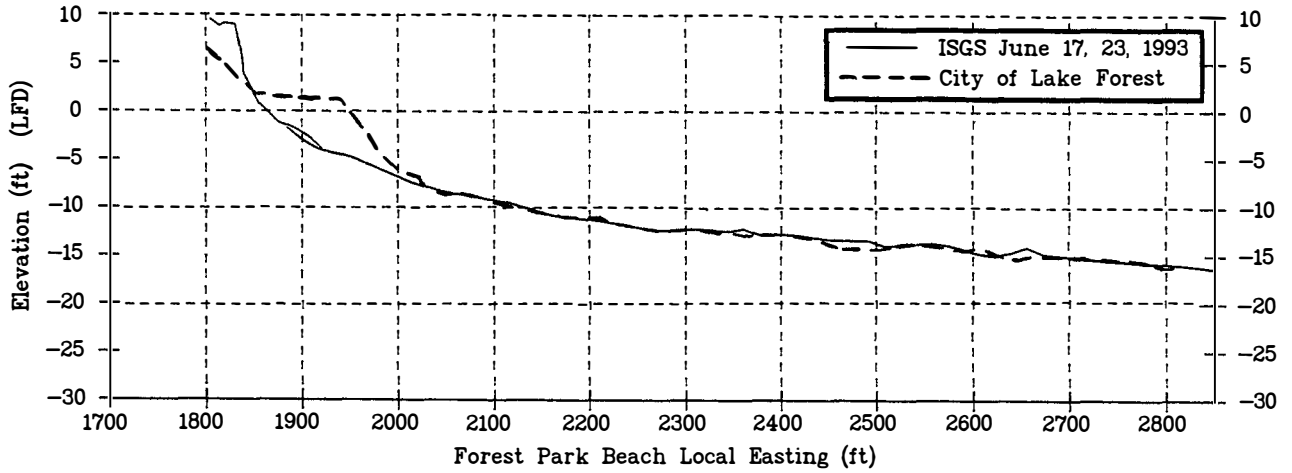

N 7000 Comparison of ISGS and City of Lake Forest 1993 Short Profiles
ISGS June 17, 23, 1993
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)


N 6900 Comparison of ISGS and City of Lake Forest 1993 Short Profiles
ISGS June 17, 23, 1993
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

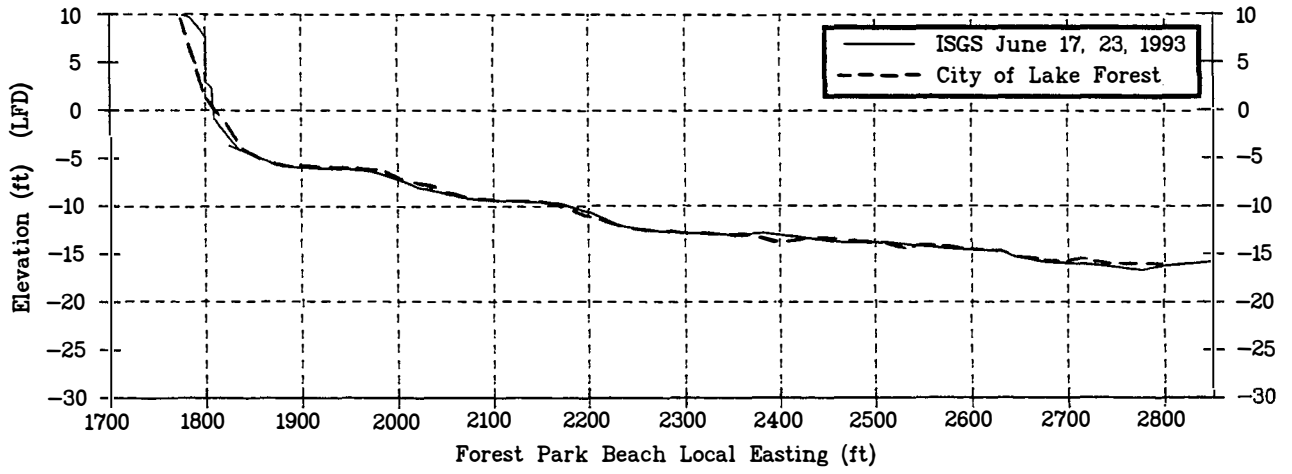
N 5617 Comparison of ISGS and City of Lake Forest 1993 Short Profiles

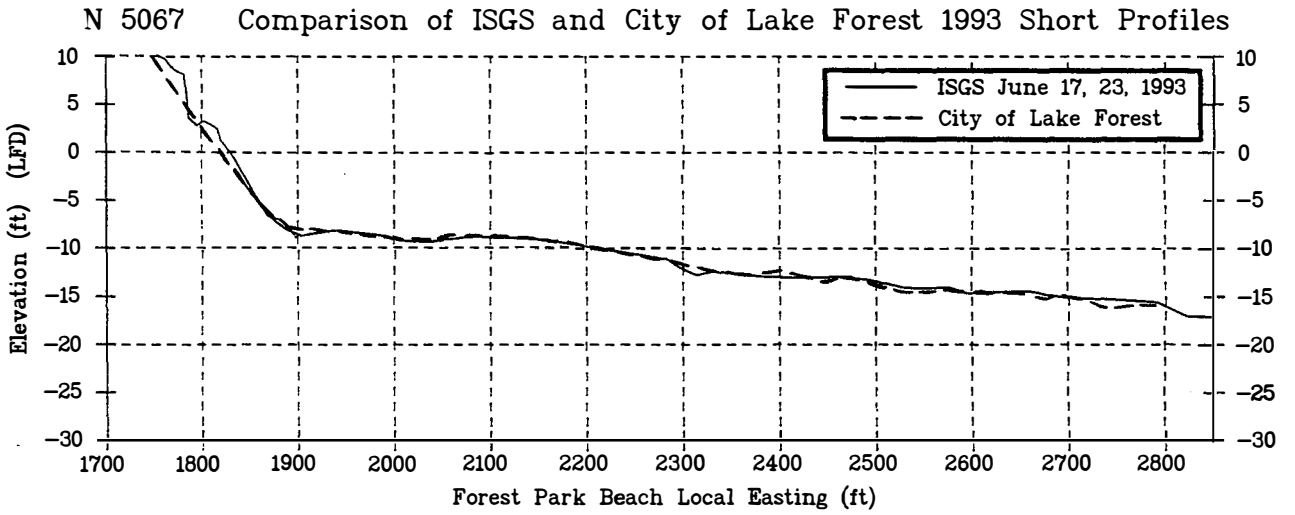


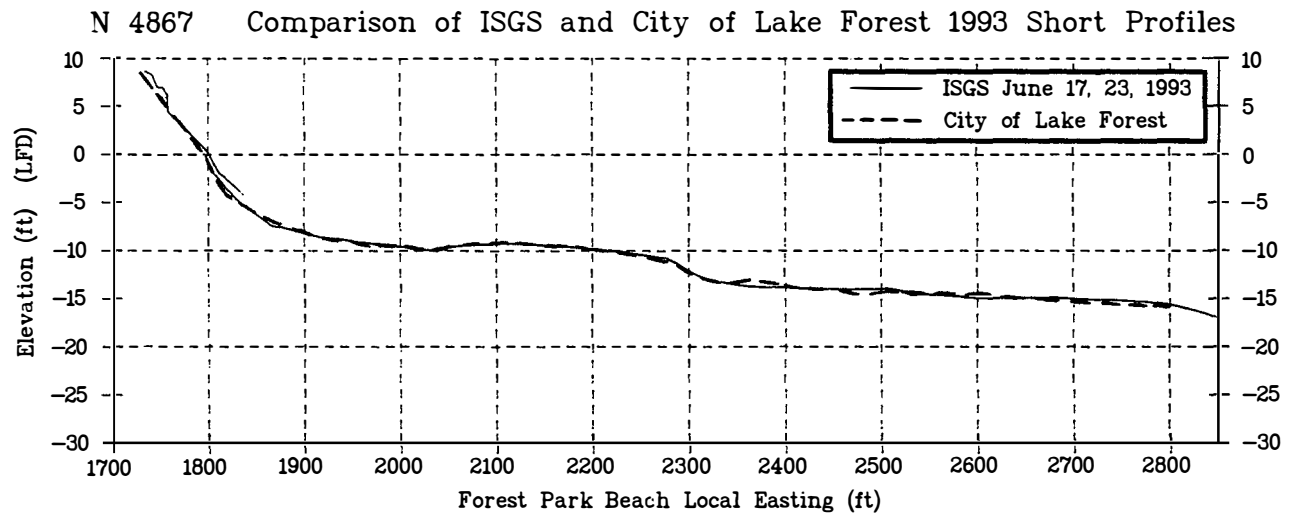
N 5417 Comparison of ISGS and City of Lake Forest 1993 Short Profiles

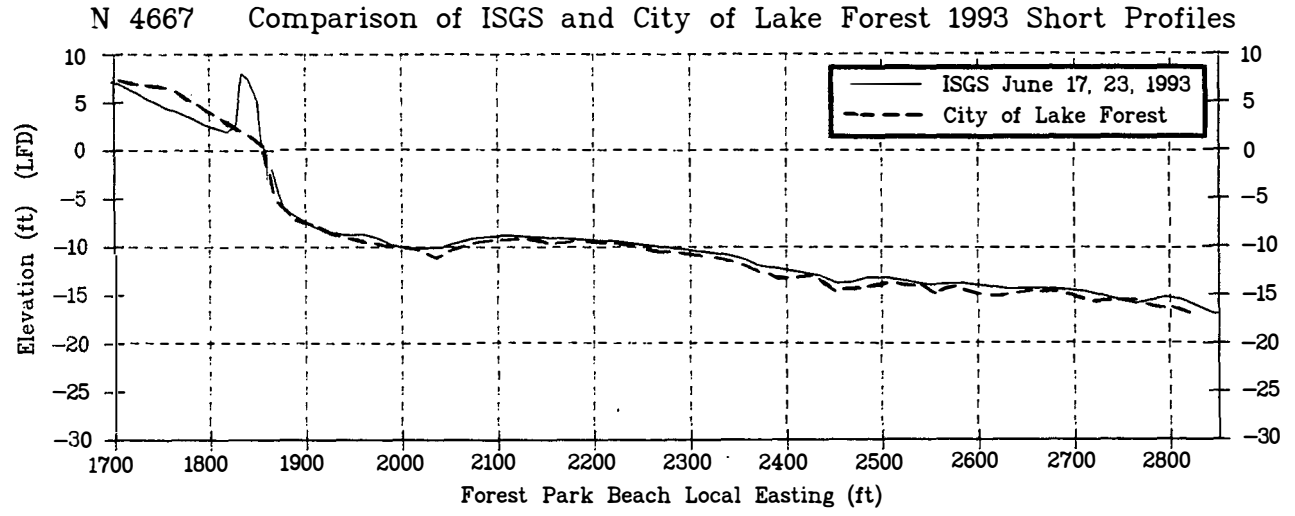


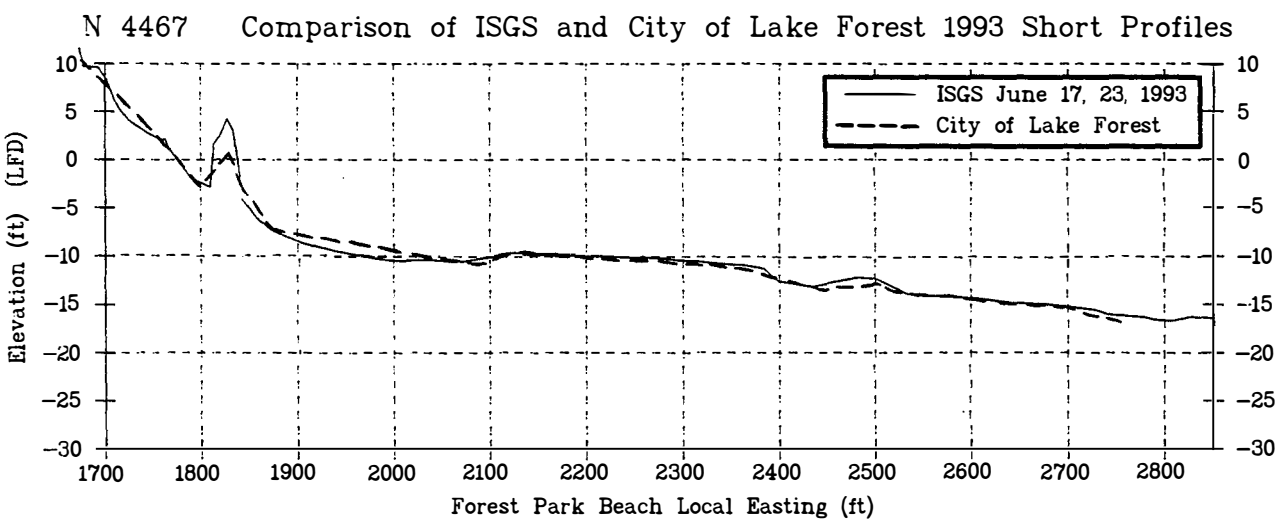
N 5267 Comparison of ISGS and City of Lake Forest 1993 Short Profiles




N 5067 Comparison of ISGS and City of Lake Forest 1993 Short Profiles
ISGS June 17, 23, 1993
City of Lake Forest
Elevation (ft) (LFD)
10
5
0
-5
-10
-15
-20
-25
-30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800
Forest Park Beach Local Easting (ft)


N 4867 Comparison of ISGS and City of Lake Forest 1993 Short Profiles
ISGS June 17, 23, 1993
City of Lake Forest
Elevation (ft) (LFD)
10
5
0
-5
-10
-15
-20
-25
-30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800
Forest Park Beach Local Easting (ft)


N 4667 Comparison of ISGS and City of Lake Forest 1993 Short Profiles
ISGS June 17, 23, 1993
City of Lake Forest
Elevation (ft) (LFD)
10
5
0
-5
-10
-15
-20
-25
-30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800
Forest Park Beach Local Easting (ft)


N 4467 Comparison of ISGS and City of Lake Forest 1993 Short Profiles
ISGS June 17, 23, 1993
City of Lake Forest
Elevation (ft) (LFD)
10
5
0
-5
-10
-15
-20
-25
-30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800
Forest Park Beach Local Easting (ft)

APPENDIX D

Calculations of Accretion and Erosion at Forest Park Beach

EXPLANATION

The tables included in this appendix contain the individual calculations of volume of accretion and erosion by intervals from the lake-bottom change maps created using the TIN method.

Table D1. Accretion and erosion at Forest Park Beach in updrift zone, determined from lake-bottom change maps.

INTERVAL	DATUM (ft)	ACCRETION (cu yds)	EROSION (cu yds)	NET CHANGE (cu yds)
1988 to 1992	0.0	4,700	10,900	−6,200
	0.5	2,000	4,500	−2,500
	1.0	900	1,500	−600
	1.5	300	300	0
	2.0	200	0	+200
	2.5	100	0	+100
	3.0	0	0	0
1992 to 1993	0.0	3,800	4,100	−300
	0.5	800	600	+200
	1.0	0	100	−100
	1.5	0	0	0
	2.0	0	0	0
	2,5	0	0	0
	3.0	0	0	0
1988 to 1993	0.0	8,500	15,000	−6,500
	0.5	2,800	5,100	−2,300
	1.0	900	1,600	−700
	1.5	300	300	0
	2.0	200	0	+200
	2.5	100	0	+100
	3.0	0	0	0

Table D2. Accretion and erosion at Forest Park Beach in the beach cells, determined from lake-bottom change maps.

INTERVAL	DATUM (ft)	ACCRETION (cu yds)	EROSION (cu yds)	NET CHANGE (cu yds)
1988 to 1992	0.0	14,600	10,000	+4,600
	0.5	10,900	5,200	+5,700
	1.0	8,100	2,500	+5,600
	1.5	5,900	1,100	+4,800
	2.0	4,000	600	+3,400
	2.5	2,600	300	+2,300
	3.0	1,600	100	+1,500
1992 to 1993	0.0	3,200	5,500	−2,300
	0.5	700	1,900	−1,200
	1.0	200	900	−700
	1.5	100	500	−400
	2.0	0	300	−300
	2.5	0	100	−100
	3.0	0	0	0
1988 to 1993	0.0	17,800	15,500	+2,300
	0.5	11,600	7,100	+4,500
	1.0	8,300	3,400	+4,900
	1.5	6,000	1,600	+4,400
	2.0	4,000	900	+3,100
	2.5	2,600	400	+2,200
	3.0	1,600	100	+1,500

Table D3. Accretion and erosion at Forest Park Beach in lakeward perimeter, determined from lake-bottom change maps.

INTERVAL	DATUM (ft)	ACCRETION (cu yds)	EROSION (cu yds)	NET CHANGE (cu yds)
1988 to 1992	0.0	46,900	4,200	+42,700
	0.5	33,800	1,700	+32,100
	1.0	23,600	900	+22,700
	1.5	15,600	500	+15,100
	2.0	9,600	200	+9,400
	2.5	5,700	100	+5,600
	3.0	3,500	0	+3,500
1992 to 1993	0.0	6,600	4,000	+2,600
	0.5	1,700	500	+1,200
	1.0	600	0	+600
	1.5	300	0	+300
	2.0	100	0	+100
	2.5	0	0	0
	3.0	0	0	0
1988 to 1993	0.0	53,500	8,200	+61,700
	0.5	35,500	2,200	+37,700
	1.0	24,200	900	+25,100
	1.5	15,900	500	+15,400
	2.0	9,700	200	+9,500
	2.5	5,700	100	+5,600
	3.0	3,500	0	+3,500

Table D4. Accretion and erosion at Forest Park Beach in the southern lakeward perimeter, determined from lake-bottom change maps.

INTERVAL	DATUM (ft)	ACCRETION (cu yds)	EROSION (cu yds)	NET CHANGE (cu yds)
1988 to 1992	0.0	5,500	7,100	−1,600
	0.5	2,700	3,900	−1,200
	1.0	900	2,200	−1,300
	1.5	200	1,200	−1,000
	2.0	0	600	−600
	2.5	0	200	−200
	3.0	0	0	0
1992 to 1993	0.0	1,500	6,500	−5,000
	0.5	400	900	−500
	1.0	100	0	+100
	1.5	0	0	0
	2.0	0	0	0
	2.5	0	0	0
	3.0	0	0	0
1988 to 1993	0.0	7,000	13,600	−6,600
	0.5	3,100	4,800	−1,700
	1.0	1,000	2,200	−1,200
	1.5	200	1,200	−1,000
	2.0	0	600	−600
	2.5	0	200	−200
	3.0	0	0	0

Table D5. Accretion and erosion at Forest Park Beach in the downdrift zone, determined from lake-bottom change maps.

INTERVAL	DATUM (ft)	ACCRETION (cu yds)	EROSION (cu yds)	NET CHANGE (cu yds)
1988 to 1992	0.0	3,600	14,600	−11,000
	0.5	1,100	7,900	−6,800
	1.0	200	3,200	−3,000
	1.5	100	900	−830
	2.0	0	300	−290
	2.5	0	100	−100
	3.0	0	100	−100
1992 to 1993	0.0	5,300	1,400	+3,900
	0.5	500	200	+300
	1.0	100	0	+100
	1.5	0	0	0
	2.0	0	0	0
	2.5	0	0	0
	3.0	0	0	0
1988 to 1993	0.0	8,900	16,000	−7,100
	0.5	1,600	8,100	−6,500
	1.0	300	3,200	−2,900
	1.5	100	900	−800
	2.0	0	300	−300
	2.5	0	0	0
	3.0	0	0	0

APPENDIX E

Particle-Size Analysis of 1993 Downdrift Nourishment

EXPLANATION

Results of particle-size analysis of three samples collected by the ISGS from the nourishment pile on July 13, 1993. All analyses performed by the laboratory of the Geotechnical Group of the ISGS Engineering Geology Section.

ISGS
SAMPLE: 10036 DATE: 09/29/93

GEOTECHNICAL LABORATORY
PARTICLE SIZE CALCULATION WORKSHEET

Sample Name= GRAVEL

Location= Lake Forest

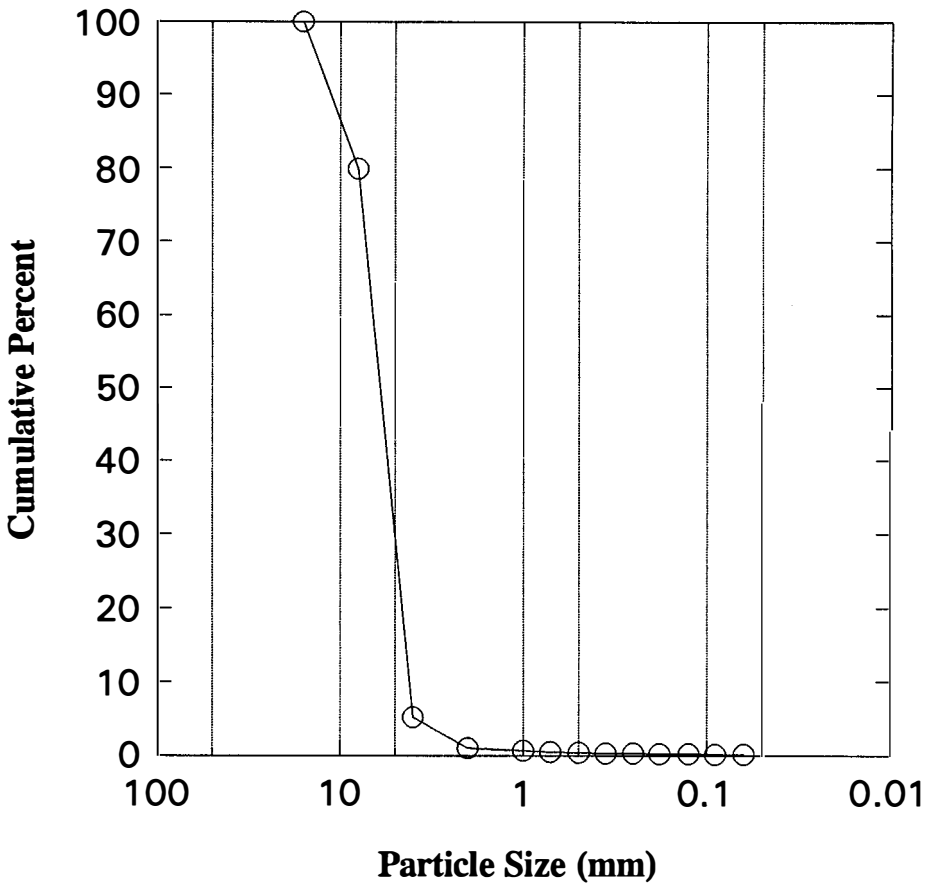
Sample Weight= 132.82 g

Screen (mm)	Weight Retained	Cum. Weight	Cum. Percent	Percent Finer
16.00	0.00	0.00	0.00	100.00
8.00	26.70	26.70	20.09	79.91
4.00	99.33	126.03	94.81	5.19
2.00	5.56	131.59	98.99	1.01
1.00	0.45	132.04	99.33	0.67
0.710	0.21	132.25	99.49	0.51
0.500	0.15	132.40	99.60	0.40
0.355	0.08	132.48	99.66	0.34
0.250	0.07	132.55	99.71	0.29
0.180	0.05	132.60	99.75	0.25
0.125	0.04	132.64	99.78	0.22
0.090	0.04	132.68	99.81	0.19
0.063	0.04	132.72	99.84	0.16
pan	0.21	132.93	100.00	0.00

Grams Retained:	132.93
Grams loss/gain:	0.11
% loss/gain:	0.08

ILLINOIS STATE GEOLOGICAL SURVEY

Project: LAKE FOREST
Sample Number: GRAVEL
ISGS Sample: 10036
Date: September 29, 1993
Unified Soil Classification: Fine Gravel



GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	CSE	MEDIUM	FINE	

ISGS
SAMPLE: 10037 DATE: 09/29/93

GEOTECHNICAL LABORATORY
PARTICLE SIZE CALCULATION WORKSHEET

Sample Name= SAND

Location= Lake Forest

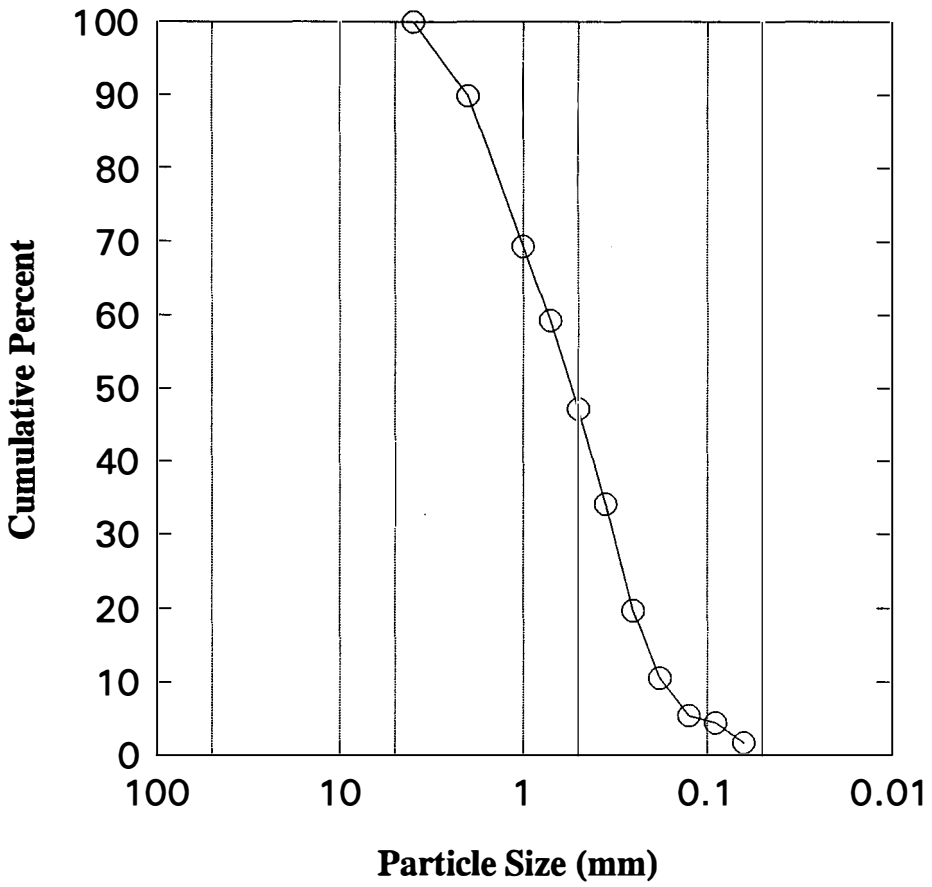
Sample Weight= 107.65 g

Screen (mm)	Weight Retained	Cum. Weight	Cum. Percent	Percent Finer
16.00	0.00	0.00	0.00	100.00
8.00	0.00	0.00	0.00	100.00
4.00	0.00	0.00	0.00	100.00
2.00	10.94	10.94	10.16	89.84
1.00	22.09	33.03	30.68	69.32
0.710	10.85	43.88	40.76	59.24
0.500	12.97	56.85	52.81	47.19
0.355	14.04	70.89	65.85	34.15
0.250	15.60	86.49	80.34	19.66
0.180	9.80	96.29	89.44	10.56
0.125	5.47	101.76	94.52	5.48
0.090	1.00	102.76	95.45	4.55
0.063	2.92	105.68	98.16	1.84
pan	1.98	107.66	100.00	0.00

Grams Retained:	107.66
Grams loss/gain:	0.01
% loss/gain:	0.01

ILLINOIS STATE GEOLOGICAL SURVEY

Project: LAKE FOREST
Sample Number: SAND
ISGS Sample: 10037
Date: September 29, 1993
Unified Soil Classification: Medium Sand



GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	CSE	MEDIUM	FINE	

ISGS
SAMPLE: DATE: 01/20/94

GEOTECHNICAL LABORATORY
PARTICLE SIZE CALCULATION WORKSHEET

Sample Name= CALCULATED COMPOSITE

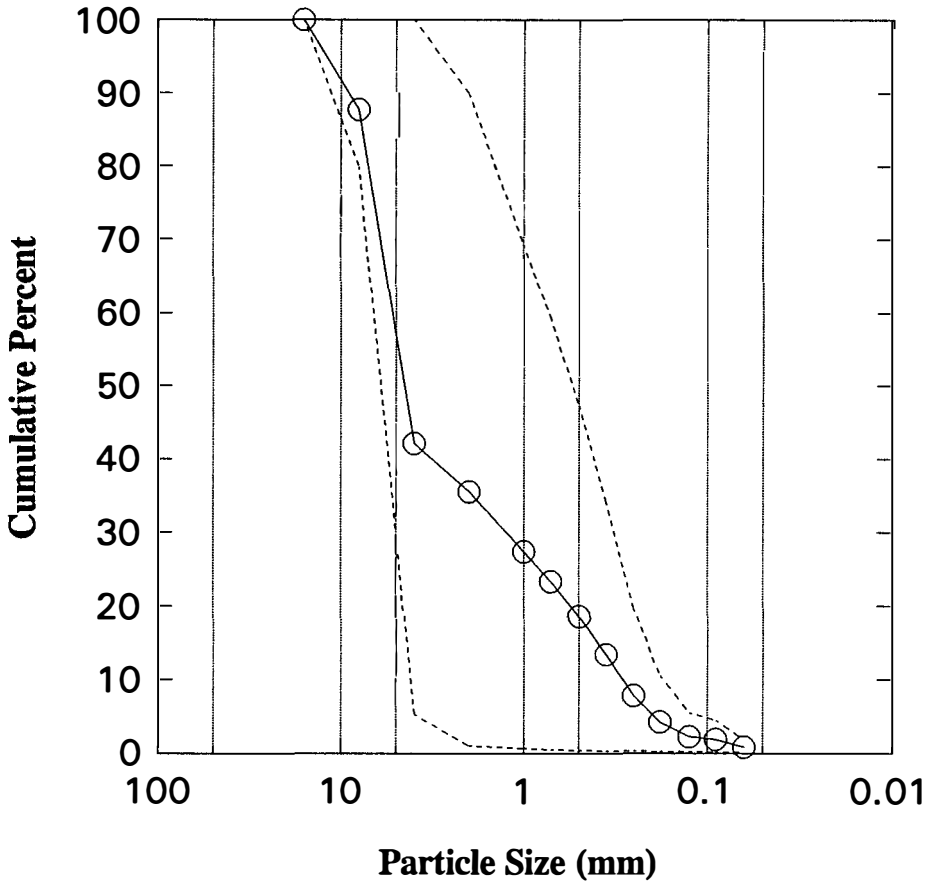
Location= Lake Forest

Sample Weight=

Screen (mm)	Weight Retained	Cum. Weight	Cum. Percent	Percent Finer
16.00	0.00	0.00	0.00	100.00
8.00	16.31	16.31	13.25	86.75
4.00	60.69	77.00	62.55	37.45
2.00	7.65	84.66	68.77	31.23
1.00	8.87	93.53	75.97	24.03
0.710	4.35	97.87	79.51	20.49
0.500	5.14	103.01	83.68	16.32
0.355	5.51	108.52	88.16	11.84
0.250	6.11	114.63	93.12	6.88
0.180	3.84	118.48	96.24	3.76
0.125	2.15	120.63	97.99	2.01
0.090	0.41	121.04	98.33	1.67
0.063	1.16	122.20	99.27	0.73
pan	0.90	123.10	100.00	100.00

ILLINOIS STATE GEOLOGICAL SURVEY

Project: LAKE FOREST
Sample Number: SAND & GRAVEL COMBINED
ISGS Sample: 10036 & 10037
Date: September 29, 1993
Unified Soil Classification: Coarse Sand



GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	CSE	MEDIUM	FINE	

APPENDIX F

Tabular Data for
ISGS 1993 Prism-Pole Surveys and Fathometer Surveys

EXPLANATION

All data are referenced to Lake Forest Datum (LFD). These data extend offshore either to the first occurrence of depth at 17.94 ft LFD (−20 ft Low Water Datum) or a distance of 550 m (1,640 ft) from the onshore Mini-Ranger station, whichever is greater.

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N9430

June 19, 1993
Start/End Time: 1236/1244 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1839.478
Low Water Datum [LWD] Correction feet −2.96

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2037090.447	638123.140	5.830	7.890
	2037093.168	638129.128	4.556	6.616
	2037095.816	638136.344	3.657	5.717
	2037098.877	638143.615	3.557	5.617
	2037101.555	638150.811	3.704	5.764
	2037104.431	638157.765	3.009	5.069
	2037107.408	638165.247	1.550	3.610
	2037108.457	638167.534	1.575	3.635
	2037111.658	638174.816	−0.028	2.032
	2037115.754	638181.802	−0.966	1.094
	2037117.812	638186.979	−3.552	−1.492
	2037120.873	638193.730	−3.745	−1.685
	2037121.929	638200.428	−3.754	−1.694
	2037121.596	638207.089	−3.903	−1.843
	2037122.115	638211.124	−4.162	−2.102
Fathometer Data				
25	2037129	638222	−4.5	−2.4
30	2037135	638238	−5.0	−2.9
35	2037141	638253	−5.7	−3.6
40	2037147	638269	−6.5	−4.4
45	2037152	638284	−6.9	−4.8
50	2037158	638300	−7.7	−5.6
55	2037164	638315	−8.3	−6.2
60	2037170	638330	−8.4	−6.3
65	2037176	638346	−8.3	−6.2
70	2037181	638361	−8.3	−6.2
75	2037187	638377	−8.4	−6.3
80	2037193	638392	−8.5	−6.4
85	2037199	638407	−8.6	−6.5
90	2037205	638422	−8.3	−6.2
95	2037210	638437	−8.7	−6.6
100	2037216	638453	−8.6	−6.5
105	2037222	638468	−8.7	−6.6
110	2037228	638483	−8.7	−6.6
115	2037234	638499	−8.8	−6.7
120	2037239	638514	−8.9	−6.8
125	2037246	638530	−9.1	−7.0
130	2037251	638545	−9.3	−7.2
135	2037257	638560	−9.5	−7.4
140	2037263	638576	−9.8	−7.7
145	2037269	638591	−10.1	−8.0
150	2037275	638607	−10.6	−8.5
155	2037280	638622	−10.9	−8.8
160	2037286	638637	−11.2	−9.1
165	2037292	638652	−11.9	−9.8
170	2037298	638667	−11.6	−9.5
175	2037304	638683	−11.7	−9.6
180	2037309	638698	−11.8	−9.7
185	2037315	638713	−11.9	−9.8
190	2037321	638729	−13.2	−11.1
195	2037327	638744	−13.3	−11.2
200	2037333	638760	−13.3	−11.2
205	2037338	638775	−13.3	−11.2
210	2037344	638790	−13.0	−10.9
215	2037350	638806	−12.2	−10.1
220	2037356	638821	−12.4	−10.3
225	2037362	638837	−12.3	−10.2
230	2037368	638852	−12.4	−10.3
235	2037373	638867	−12.5	−10.4
240	2037379	638882	−12.5	−10.4
245	2037385	638897	−12.6	−10.5
250	2037391	638913	−12.7	−10.6
255	2037397	638928	−12.8	−10.7
260	2037402	638943	−13.0	−10.9
265	2037408	638959	−13.0	−10.9
270	2037414	638974	−13.1	−11.0
275	2037420	638990	−13.3	−11.2
280	2037426	639005	−13.2	−11.1
285	2037432	639021	−13.6	−11.5
290	2037437	639036	−13.7	−11.6
295	2037443	639051	−13.9	−11.8
300	2037449	639067	−14.0	−11.9
305	2037455	639082	−14.1	−12.0
310	2037461	639097	−14.5	−12.4
315	2037467	639112	−14.9	−12.8
320	2037472	639127	−15.5	−13.4
325	2037478	639143	−15.7	−13.6
330	2037484	639158	−16.8	−14.7
335	2037490	639174	−16.5	−14.4
340	2037496	639189	−17.0	−14.9
345	2037501	639204	−17.1	−15.0
350	2037507	639220	−17.6	−15.5
355	2037513	639235	−17.7	−15.6
360	2037519	639251	−17.7	−15.6
365	2037525	639266	−18.1	−16.0
370	2037530	639281	−17.6	−15.5
375	2037536	639297	−18.2	−16.1
380	2037542	639312	−18.1	−16.0
385	2037548	639327	−17.4	−15.3
390	2037554	639342	−17.8	−15.7
395	2037559	639357	−17.5	−15.4
400	2037566	639373	−18.8	−16.7
405	2037571	639388	−19.2	−17.1
410	2037577	639404	−19.6	−17.5
415	2037583	639419	−20.0	−17.9
420	2037589	639434	−20.3	−18.2
425	2037595	639450	−20.5	−18.4
430	2037600	639465	−20.4	−18.3
435	2037606	639481	−20.8	−18.7
440	2037612	639496	−20.9	−18.8
445	2037618	639511	−21.2	−19.1
450	2037624	639527	−21.5	−19.4
455	2037629	639542	−21.2	−19.1
460	2037635	639557	−22.1	−20.0
465	2037641	639572	−21.4	−19.3
470	2037647	639587	−22.1	−20.0
475	2037653	639603	−21.9	−19.8
480	2037658	639618	−22.2	−20.1
485	2037664	639634	−21.4	−19.3
490	2037670	639649	−20.8	−18.7
495	2037676	639664	−20.7	−18.6
500	2037682	639680	−20.7	−18.6
505	2037688	639695	−21.2	−19.1
510	2037694	639711	−22.4	−20.3
515	2037699	639726	−21.6	−19.5
520	2037705	639742	−22.5	−20.4
525	2037711	639757	−22.6	−20.5
530	2037717	639772	−22.9	−20.8
535	2037723	639787	−23.1	−21.0
540	2037728	639802	−23.1	−21.0
545	2037734	639818	−23.3	−21.2
550	2037740	639833	−23.2	−21.1

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N9230

June 19, 1993
Start/End Time: 1200/1209 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1838.482
Low Water Datum [LWD] Correction feet −2.88

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2036906.562	638200.541	7.916	9.976
	2036908.791	638206.200	6.372	8.432
	2036910.626	638211.219	5.156	7.216
	2036913.626	638218.029	3.724	5.784
	2036916.755	638226.167	2.658	4.718
	2036919.337	638232.681	1.477	3.537
	2036921.050	638236.848	0.839	2.899
	2036924.707	638245.137	−0.415	1.645
	2036928.308	638255.136	−1.439	0.621
	2036933.839	638268.697	−2.437	−0.377
	2036939.159	638281.264	−3.057	−0.997
	2036945.021	638294.145	−3.440	−1.380
	2036947.520	638307.080	−4.076	−2.016
Fathometer Data				
30	2036948	638308	−4.5	−2.4
35	2036953	638323	−5.4	−3.3
40	2036959	638339	−6.2	−4.1
45	2036965	638354	−6.7	−4.6
50	2036971	638370	−7.1	−5.0
55	2036977	638385	−7.3	−5.2
60	2036982	638400	−7.6	−5.5
65	2036988	638416	−7.7	−5.6
70	2036994	638431	−8.0	−5.9
75	2037000	638447	−8.2	−6.1
80	2037006	638462	−8.3	−6.2
85	2037011	638477	−8.4	−6.3
90	2037017	638492	−8.4	−6.3
95	2037023	638507	−8.4	−6.3
100	2037029	638523	−8.5	−6.4
105	2037035	638538	−8.5	−6.4
110	2037040	638553	−8.4	−6.3
115	2037046	638569	−8.4	−6.3
120	2037052	638584	−8.6	−6.5
125	2037058	638600	−8.6	−6.5
130	2037064	638615	−8.8	−6.7
135	2037070	638630	−9.0	−6.9
140	2037076	638646	−9.1	−7.0
145	2037081	638661	−9.2	−7.1
150	2037087	638677	−9.4	−7.3
155	2037093	638692	−9.8	−7.7
160	2037099	638707	−10.5	−8.4
165	2037105	638722	−10.8	−8.7
170	2037110	638737	−11.2	−9.1
175	2037116	638753	−11.9	−9.8
180	2037122	638768	−12.0	−9.9
185	2037128	638783	−12.5	−10.4
190	2037134	638799	−13.6	−11.5
195	2037139	638814	−14.1	−12.0
200	2037145	638830	−13.6	−11.5
205	2037151	638845	−13.4	−11.3
210	2037157	638860	−13.5	−11.4
215	2037163	638876	−13.8	−11.7
220	2037169	638891	−14.0	−11.9
225	2037175	638907	−13.1	−11.0
230	2037180	638922	−13.2	−11.1
235	2037186	638937	−13.2	−11.1
240	2037192	638952	−13.2	−11.1
245	2037198	638967	−13.6	−11.5
250	2037204	638983	−13.9	−11.8
255	2037209	638998	−14.5	−12.4
260	2037215	639014	−14.8	−12.7
265	2037221	639029	−15.3	−13.2
270	2037227	639044	−15.7	−13.6
275	2037233	639060	−16.0	−13.9
280	2037238	639075	−16.7	−14.6
285	2037244	639091	−16.5	−14.4
290	2037250	639106	−16.7	−14.6
295	2037256	639121	−16.8	−14.7
300	2037262	639137	−17.0	−14.9
305	2037267	639152	−17.7	−15.6
310	2037274	639167	−18.1	−16.0
315	2037279	639182	−17.7	−15.6
320	2037285	639197	−16.7	−14.6
325	2037291	639213	−17.4	−15.3
330	2037297	639228	−18.1	−16.0
335	2037303	639244	−18.2	−16.1
340	2037308	639259	−18.5	−16.4
345	2037314	639274	−18.6	−16.5
350	2037320	639290	−17.8	−15.7
355	2037326	639305	−18.7	−16.6
360	2037332	639321	−18.6	−16.5
365	2037337	639336	−19.1	−17.0
370	2037343	639351	−18.9	−16.8
375	2037349	639367	−17.9	−15.8
380	2037355	639382	−18.6	−16.5
385	2037361	639397	−19.1	−17.0
390	2037366	639412	−20.0	−17.9
395	2037372	639427	−20.4	−18.3
400	2037378	639443	−20.8	−18.7
405	2037384	639458	−20.2	−18.1
410	2037390	639474	−21.0	−18.9
415	2037396	639489	−20.4	−18.3
420	2037401	639504	−19.8	−17.7
425	2037407	639520	−20.4	−18.3
430	2037413	639535	−21.0	−18.9
435	2037419	639551	−21.5	−19.4
440	2037425	639566	−21.2	−19.1
445	2037430	639581	−21.5	−19.4
450	2037436	639597	−21.1	−19.0
455	2037442	639612	−21.6	−19.5
460	2037448	639627	−22.0	−19.9
465	2037454	639642	−20.7	−18.6
470	2037459	639657	−21.2	−19.1
475	2037465	639673	−22.0	−19.9
480	2037471	639688	−21.7	−19.6
485	2037477	639704	−21.7	−19.6
490	2037483	639719	−22.2	−20.1
495	2037488	639734	−22.7	−20.6
500	2037495	639750	−23.3	−21.2
505	2037500	639765	−22.8	−20.7
510	2037506	639781	−23.3	−21.2
515	2037512	639796	−22.7	−20.6
520	2037518	639812	−21.7	−19.6
525	2037524	639827	−22.2	−20.1
530	2037529	639842	−23.6	−21.5
535	2037535	639857	−22.8	−20.7
540	2037541	639872	−21.9	−19.8
545	2037547	639888	−22.3	−20.2
550	2037553	639903	−22.2	−20.1

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N9030

June 19, 1993
Start/End Time: 1145/1157 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1894.252
Low Water Datum [LWD] Correction feet −2.88

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2036733.179	638307.643	8.810	10.870
	2036733.933	638310.436	9.608	11.668
	2036734.696	638313.052	7.384	9.444
	2036736.124	638315.075	7.444	9.504
	2036737.088	638316.432	4.225	6.285
	2036738.755	638321.297	3.627	5.688
	2036741.172	638327.559	3.078	5.138
	2036744.108	638335.459	2.079	4.139
	2036745.668	638340.487	2.080	4.140
	2036748.299	638348.185	0.821	2.881
	2036751.655	638357.402	−0.427	1.633
	2036754.508	638365.147	−1.267	0.793
	2036758.946	638376.510	−2.632	−0.572
	2036766.534	638398.005	−3.092	−1.032
	2036771.335	638413.256	−3.822	−1.762
	2036773.797	638419.133	−4.283	−2.223
Fathometer Data				
30	2036780	638432	−6.5	−4.4
35	2036786	638447	−6.7	−4.6
40	2036792	638461	−7.6	−5.5
45	2036798	638477	−7.7	−5.6
50	2036803	638492	−7.4	−5.3
55	2036809	638508	−7.3	−5.2
60	2036815	638523	−7.4	−5.3
65	2036821	638539	−7.7	−5.6
70	2036827	638554	−8.2	−6.1
75	2036833	638569	−8.2	−6.1
80	2036839	638585	−8.4	−6.3
85	2036844	638600	−8.3	−6.2
90	2036850	638616	−8.3	−6.2
95	2036856	638631	−8.3	−6.2
100	2036862	638646	−8.1	−6.0
105	2036868	638662	−8.6	−6.5
110	2036873	638677	−8.4	−6.3
115	2036879	638692	−8.7	−6.6
120	2036885	638707	−9.0	−6.9
125	2036891	638722	−9.2	−7.1
130	2036897	638738	−9.7	−7.6
135	2036902	638753	−10.0	−7.9
140	2036908	638769	−10.2	−8.1
145	2036914	638784	−11.1	−9.0
150	2036920	638799	−12.1	−10.0
155	2036926	638815	−12.7	−10.6
160	2036931	638830	−12.8	−10.7
165	2036938	638846	−13.2	−11.1
170	2036943	638861	−13.5	−11.4
175	2036949	638876	−13.4	−11.3
180	2036955	638892	−12.7	−10.6
185	2036961	638907	−12.0	−9.9
190	2036967	638922	−12.2	−10.1
195	2036972	638937	−12.8	−10.7
200	2036978	638952	−13.4	−11.3
205	2036984	638968	−14.1	−12.0
210	2036990	638983	−14.0	−11.9
215	2036996	638999	−14.7	−12.6
220	2037001	639014	−14.8	−12.7
225	2037007	639029	−15.2	−13.1
230	2037013	639045	−15.1	−13.0
235	2037019	639060	−15.2	−13.1
240	2037025	639076	−16.2	−14.1
245	2037030	639091	−16.8	−14.7
250	2037036	639106	−16.2	−14.1
255	2037042	639122	−16.8	−14.7
260	2037048	639137	−17.2	−15.1
265	2037054	639152	−17.4	−15.3
270	2037060	639167	−16.3	−14.2
275	2037065	639182	−16.7	−14.6
280	2037071	639198	−17.0	−14.9
285	2037077	639213	−17.8	−15.7
290	2037083	639229	−17.2	−15.1
295	2037089	639244	−17.5	−15.4
300	2037095	639260	−18.5	−16.4
305	2037100	639275	−18.2	−16.1
310	2037106	639290	−17.7	−15.6
315	2037112	639306	−18.7	−16.6
320	2037118	639321	−18.8	−16.7
325	2037124	639337	−19.4	−17.3
330	2037129	639352	−19.4	−17.3
335	2037135	639367	−19.2	−17.1
340	2037141	639382	−19.2	−17.1
345	2037147	639397	−19.5	−17.4
350	2037153	639413	−19.8	−17.7
355	2037159	639428	−20.2	−18.1
360	2037164	639443	−20.5	−18.4
365	2037170	639459	−19.9	−17.8
370	2037176	639474	−21.1	−19.0
375	2037182	639490	−20.9	−18.8
380	2037188	639505	−21.8	−19.7
385	2037193	639520	−21.2	−19.1
390	2037199	639536	−19.7	−17.6
395	2037205	639551	−20.7	−18.6
400	2037211	639567	−20.8	−18.7
405	2037217	639582	−21.2	−19.1
410	2037222	639597	−20.5	−18.4
415	2037228	639612	−20.7	−18.6
420	2037234	639627	−21.7	−19.6
425	2037240	639643	−21.2	−19.1
430	2037246	639658	−21.2	−19.1
435	2037251	639673	−20.8	−18.7
440	2037258	639689	−20.7	−18.6
445	2037263	639704	−20.0	−17.9
450	2037269	639720	−19.9	−17.8
455	2037275	639735	−20.6	−18.5
460	2037281	639750	−20.4	−18.3
465	2037287	639766	−20.7	−18.6
470	2037292	639781	−20.6	−18.5
475	2037298	639797	−20.7	−18.6
480	2037304	639812	−21.7	−19.6
485	2037310	639827	−22.1	−20.0
490	2037316	639842	−22.2	−20.1
495	2037321	639857	−22.5	−20.4
500	2037327	639873	−21.4	−19.3
505	2037333	639888	−21.8	−19.7
510	2037339	639903	−21.1	−19.0
515	2037345	639919	−21.3	−19.2
520	2037350	639934	−21.2	−19.1
525	2037356	639950	−20.9	−18.8
530	2037362	639965	−20.7	−18.6
535	2037368	639981	−21.6	−19.5
540	2037374	639996	−21.3	−19.2
545	2037380	640011	−21.0	−18.9
550	2037386	640027	−21.2	−19.1

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N8830

June 19, 1993
Start/End Time: 1127/1136 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1900.194
Low Water Datum [LWD] Correction feet −2.94

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2036548.237	638384.692	5.668	7.728
	2036551.003	638391.944	5.080	7.140
	2036554.584	638401.246	4.265	6.325
	2036560.216	638415.219	3.107	5.167
	2036566.879	638432.970	2.412	4.472
	2036572.071	638447.529	1.725	3.785
	2036574.293	638454.650	0.994	3.054
	2036578.671	638463.475	−0.415	1.645
	2036583.064	638474.208	−1.783	0.277
	2036585.425	638484.453	−3.059	−0.999
	2036594.562	638502.772	−2.838	−0.778
	2036600.213	638522.112	−3.550	−1.490
	2036604.368	638534.245	−4.001	−1.941
Fathometer Data				
40	2036607	638538	−4.5	−2.5
45	2036613	638554	−5.1	−3.1
50	2036619	638569	−5.8	−3.8
55	2036625	638585	−6.1	−4.1
60	2036630	638600	−6.6	−4.6
65	2036636	638615	−7.0	−5.0
70	2036642	638631	−7.2	−5.2
75	2036648	638646	−7.4	−5.4
80	2036654	638661	−7.5	−5.5
85	2036659	638676	−7.6	−5.6
90	2036665	638691	−7.6	−5.6
95	2036671	638707	−7.7	−5.7
100	2036677	638722	−7.9	−5.9
105	2036683	638738	−8.1	−6.1
110	2036688	638753	−8.3	−6.3
115	2036694	638768	−8.6	−6.6
120	2036700	638784	−9.0	−7.0
125	2036706	638799	−9.3	−7.3
130	2036712	638815	−9.5	−7.5
135	2036718	638830	−9.8	−7.8
140	2036724	638846	−10.1	−8.1
145	2036729	638861	−10.4	−8.4
150	2036735	638876	−10.8	−8.8
155	2036741	638891	−11.5	−9.5
160	2036747	638906	−12.0	−10.0
165	2036753	638922	−11.7	−9.7
170	2036758	638937	−11.6	−9.6
175	2036764	638952	−11.5	−9.5
180	2036770	638968	−11.6	−9.6
185	2036776	638983	−12.1	−10.1
190	2036782	638999	−14.1	−12.1
195	2036787	639014	−13.5	−11.5
200	2036793	639029	−13.5	−11.5
205	2036799	639045	−14.3	−12.3
210	2036805	639060	−15.1	−13.1
215	2036811	639076	−14.6	−12.6
220	2036817	639091	−15.7	−13.7
225	2036822	639106	−15.4	−13.4
230	2036828	639121	−15.3	−13.3
235	2036834	639136	−16.1	−14.1
240	2036840	639152	−17.0	−15.0
245	2036846	639167	−17.2	−15.2
250	2036851	639182	−17.3	−15.3
255	2036857	639198	−16.9	−14.9
260	2036863	639213	−16.1	−14.1
265	2036869	639229	−16.3	−14.3
270	2036875	639244	−17.5	−15.5
275	2036880	639259	−16.2	−14.2
280	2036886	639275	−17.5	−15.5
285	2036892	639290	−17.3	−15.3
290	2036898	639306	−16.8	−14.8
295	2036904	639321	−16.6	−14.6
300	2036909	639336	−18.1	−16.1
305	2036915	639351	−17.8	−15.8
310	2036921	639366	−19.0	−17.0
315	2036927	639382	−19.2	−17.2
320	2036933	639397	−17.3	−15.3
325	2036939	639412	−17.2	−15.2
330	2036945	639428	−18.3	−16.3
335	2036950	639443	−18.8	−16.8
340	2036956	639459	−19.4	−17.4
345	2036962	639474	−19.8	−17.8
350	2036968	639489	−20.2	−18.2
355	2036974	639505	−20.4	−18.4
360	2036979	639520	−20.8	−18.8
365	2036985	639536	−20.6	−18.6
370	2036991	639551	−21.0	−19.0
375	2036997	639566	−21.0	−19.0
380	2037003	639581	−20.8	−18.8
385	2037008	639596	−20.4	−18.4
390	2037014	639612	−19.7	−17.7
395	2037020	639627	−19.1	−17.1
400	2037026	639643	−20.2	−18.2
405	2037032	639658	−20.7	−18.7
410	2037038	639673	−21.1	−19.1
415	2037044	639689	−20.6	−18.6
420	2037049	639704	−21.9	−19.9
425	2037055	639720	−22.1	−20.1
430	2037061	639735	−22.1	−20.1
435	2037067	639750	−22.1	−20.1
440	2037073	639766	−21.8	−19.8
445	2037078	639781	−22.5	−20.5
450	2037084	639796	−22.4	−20.4
455	2037090	639811	−22.5	−20.5
460	2037096	639826	−22.1	−20.1
465	2037102	639842	−22.0	−20.0
470	2037107	639857	−22.3	−20.3
475	2037113	639873	−21.9	−19.9
480	2037119	639888	−21.5	−19.5
485	2037125	639903	−21.6	−19.6
490	2037131	639919	−20.4	−18.4
495	2037136	639934	−21.3	−19.3
500	2037143	639950	−21.5	−19.5
505	2037148	639965	−20.9	−18.9
510	2037154	639980	−21.4	−19.4
515	2037160	639996	−20.5	−18.5
520	2037166	640011	−21.1	−19.1
525	2037172	640026	−20.9	−18.9
530	2037177	640041	−20.5	−18.5
535	2037183	640056	−20.7	−18.7
540	2037189	640072	−20.7	−18.7
545	2037195	640087	−20.6	−18.6
550	2037201	640103	−21.1	−19.1

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N8630

June 19, 1993
Start/End Time: 1055/1104 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1942.472
Low Water Datum [LWD] Correction feet −3.00

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2036373.795	638484.974	3.995	6.055
	2036374.971	638490.725	3.433	5.493
	2036378.153	638498.099	3.557	5.617
	2036382.013	638509.802	3.116	5.176
	2036385.973	638519.559	2.410	4.470
	2036390.307	638529.569	1.969	4.029
	2036393.060	638539.242	1.621	3.681
	2036394.179	638541.460	1.251	3.311
	2036397.379	638547.135	1.537	3.597
	2036400.274	638553.540	1.677	3.737
	2036401.235	638557.329	1.669	3.729
	2036402.327	638561.336	0.812	2.872
	2036405.097	638570.189	−0.552	1.508
	2036408.192	638580.475	−2.365	−0.305
	2036410.484	638587.402	−3.751	−1.691
	2036415.756	638598.728	−3.112	−1.052
	2036423.428	638617.959	−3.284	−1.224
	2036427.166	638628.126	−3.771	−1.711
Fathometer Data				
35	2036429	638633	−4.2	−2.1
40	2036435	638649	−5.1	−3.0
45	2036441	638664	−5.8	−3.7
50	2036447	638680	−6.4	−4.3
55	2036453	638695	−6.8	−4.7
60	2036458	638710	−7.1	−5.0
65	2036464	638726	−7.4	−5.3
70	2036470	638741	−7.5	−5.4
75	2036476	638757	−7.6	−5.5
80	2036482	638772	−7.7	−5.6
85	2036487	638787	−7.8	−5.7
90	2036493	638803	−8.0	−5.9
95	2036499	638817	−8.1	−6.0
100	2036505	638833	−8.4	−6.3
105	2036511	638848	−8.6	−6.5
110	2036516	638863	−8.9	−6.8
115	2036522	638879	−9.1	−7.0
120	2036528	638894	−9.4	−7.3
125	2036534	638910	−9.8	−7.7
130	2036540	638925	−10.1	−8.0
135	2036545	638940	−10.4	−8.3
140	2036551	638956	−10.9	−8.8
145	2036557	638971	−11.5	−9.4
150	2036563	638987	−11.1	−9.0
155	2036569	639002	−11.2	−9.1
160	2036575	639017	−11.5	−9.4
165	2036581	639033	−11.9	−9.8
170	2036586	639047	−12.9	−10.8
175	2036592	639063	−13.7	−11.6
180	2036598	639078	−14.1	−12.0
185	2036604	639093	−14.3	−12.2
190	2036610	639109	−14.2	−12.1
195	2036615	639124	−14.1	−12.0
200	2036621	639140	−14.1	−12.0
205	2036627	639155	−14.4	−12.3
210	2036633	639170	−13.6	−11.5
215	2036639	639186	−14.7	−12.6
220	2036644	639201	−14.7	−12.6
225	2036650	639217	−15.8	−13.7
230	2036656	639232	−15.1	−13.0
235	2036662	639247	−14.9	−12.8
240	2036668	639263	−14.8	−12.7
245	2036674	639277	−16.6	−14.5
250	2036680	639293	−15.7	−13.6
255	2036685	639308	−15.2	−13.1
260	2036691	639323	−16.5	−14.4
265	2036697	639339	−16.4	−14.3
270	2036703	639354	−18.0	−15.9
275	2036709	639370	−17.6	−15.5
280	2036714	639385	−18.0	−15.9
285	2036720	639401	−18.1	−16.0
290	2036726	639416	−18.2	−16.1
295	2036732	639431	−18.3	−16.2
300	2036738	639447	−18.3	−16.2
305	2036743	639462	−18.1	−16.0
310	2036749	639478	−18.1	−16.0
315	2036755	639493	−18.8	−16.7
320	2036761	639507	−18.9	−16.8
325	2036767	639523	−17.2	−15.1
330	2036772	639538	−18.2	−16.1
335	2036779	639554	−18.9	−16.8
340	2036784	639569	−19.6	−17.5
345	2036790	639584	−20.0	−17.9
350	2036796	639600	−20.8	−18.7
355	2036802	639615	−20.8	−18.7
360	2036808	639631	−20.9	−18.8
365	2036813	639646	−20.9	−18.8
370	2036819	639661	−20.6	−18.5
375	2036825	639677	−21.0	−18.9
380	2036831	639692	−21.8	−19.7
385	2036837	639708	−21.9	−19.8
390	2036842	639723	−22.0	−19.9
395	2036848	639737	−21.8	−19.7
400	2036854	639753	−21.6	−19.5
405	2036860	639768	−21.6	−19.5
410	2036866	639784	−21.5	−19.4
415	2036871	639799	−21.6	−19.5
420	2036877	639814	−22.0	−19.9
425	2036883	639830	−22.9	−20.8
430	2036889	639845	−22.7	−20.6
435	2036895	639861	−22.2	−20.1
440	2036901	639876	−22.2	−20.1
445	2036906	639891	−22.3	−20.2
450	2036912	639907	−22.5	−20.4
455	2036918	639922	−23.3	−21.2
460	2036924	639938	−22.3	−20.2
465	2036930	639953	−22.3	−20.2
470	2036935	639967	−22.2	−20.1
475	2036941	639983	−23.5	−21.4
480	2036947	639998	−23.1	−21.0
485	2036953	640014	−23.3	−21.2
490	2036959	640029	−23.2	−21.1
495	2036964	640044	−23.4	−21.3
500	2036970	640060	−23.2	−21.1
505	2036976	640075	−22.8	−20.7
510	2036982	640091	−23.2	−21.1
515	2036988	640106	−23.1	−21.0
520	2036994	640122	−22.8	−20.7
525	2037000	640137	−22.6	−20.5
530	2037005	640152	−22.6	−20.5
535	2037011	640168	−22.6	−20.5
540	2037017	640183	−22.3	−20.2
545	2037023	640198	−22.0	−19.9
550	2037029	640213	−21.1	−19.0

1993FOREST PARKBEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N8430

June 18, 1993
Start/End Time: 1214/1220 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2058.369
Low Water Datum [LWD] Correction feet −2.93

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2036190.661	638570.754	8.327	10.387
	2036193.927	638577.393	6.297	8.357
	2036196.466	638585.210	5.309	7.369
	2036201.106	638598.562	4.521	6.581
	2036208.129	638615.519	3.365	5.425
	2036214.582	638632.438	2.194	4.254
	2036220.365	638648.882	1.957	4.017
	2036225.408	638660.352	1.662	3.722
	2036230.619	638674.737	0.863	2.923
	2036232.894	638679.076	0.527	2.587
	2036235.290	638686.026	−0.246	1.814
	2036235.548	638690.251	3.131	5.191
	2036236.302	638693.107	4.392	6.452
	2036239.071	638696.682	6.632	8.692
	2036246.061	638713.179	5.579	7.639
	2036249.324	638721.694	3.495	5.555
	2036249.512	638722.313	1.186	3.246
	2036250.197	638728.992	−0.698	1.362
	2036250.866	638731.183	−5.747	−3.687
Fathometer Data				
10	2036254	638736	−5.1	−3.1
15	2036260	638752	−5.3	−3.3
20	2036266	638767	−4.9	−2.9
25	2036272	638782	−4.9	−2.9
30	2036278	638798	−5.6	−3.6
35	2036283	638813	−6.3	−4.3
40	2036289	638829	−7.1	−5.1
45	2036295	638844	−7.6	−5.6
50	2036301	638859	−7.8	−5.8
55	2036307	638874	−8.1	−6.1
60	2036312	638889	−8.4	−6.4
65	2036318	638905	−8.6	−6.6
70	2036324	638920	−8.8	−6.8
75	2036330	638935	−9.2	−7.2
80	2036336	638951	−9.5	−7.5
85	2036341	638966	−9.6	−7.6
90	2036347	638982	−10.1	−8.1
95	2036353	638997	−10.2	−8.2
100	2036359	639012	−10.3	−8.3
105	2036365	639028	−10.5	−8.5
110	2036371	639043	−10.6	−8.6
115	2036377	639059	−10.8	−8.8
120	2036382	639074	−11.1	−9.1
125	2036388	639089	−11.8	−9.8
130	2036394	639104	−12.6	−10.6
135	2036400	639119	−12.1	−10.1
140	2036406	639135	−12.4	−10.4
145	2036411	639150	−12.6	−10.6
150	2036417	639165	−13.4	−11.4
155	2036423	639181	−13.5	−11.5
160	2036429	639196	−12.8	−10.8
165	2036435	639212	−13.6	−11.6
170	2036440	639227	−14.1	−12.1
175	2036446	639243	−15.2	−13.2
180	2036452	639258	−15.2	−13.2
185	2036458	639273	−14.9	−12.9
190	2036464	639289	−16.5	−14.5
195	2036469	639304	−15.4	−13.4
200	2036476	639319	−14.8	−12.8
205	2036481	639334	−17.1	−15.1
210	2036487	639349	−15.8	−13.8
215	2036493	639365	−16.2	−14.2
220	2036499	639380	−16.9	−14.9
225	2036505	639396	−16.1	−14.1
230	2036510	639411	−16.2	−14.2
235	2036516	639426	−16.9	−14.9
240	2036522	639442	−15.8	−13.8
245	2036528	639457	−16.9	−14.9
250	2036534	639473	−16.8	−14.8
255	2036539	639488	−16.5	−14.5
260	2036545	639503	−17.9	−15.9
265	2036551	639519	−18.3	−16.3
270	2036557	639534	−18.8	−16.8
275	2036563	639549	−18.2	−16.2
280	2036568	639564	−19.6	−17.6
285	2036574	639579	−19.2	−17.2
290	2036580	639595	−19.3	−17.3
295	2036586	639610	−20.1	−18.1
300	2036592	639626	−19.6	−17.6
305	2036598	639641	−20.9	−18.9
310	2036603	639656	−20.1	−18.1
315	2036609	639672	−21.5	−19.5
320	2036615	639687	−21.9	−19.9
325	2036621	639703	−21.4	−19.4
330	2036627	639718	−20.1	−18.1
335	2036632	639733	−21.4	−19.4
340	2036638	639749	−21.4	−19.4
345	2036644	639764	−21.6	−19.6
350	2036650	639779	−21.5	−19.5
355	2036656	639794	−19.9	−17.9
360	2036661	639809	−19.9	−17.9
365	2036667	639825	−20.9	−18.9
370	2036673	639840	−20.9	−18.9
375	2036679	639856	−21.1	−19.1
380	2036685	639871	−21.1	−19.1
385	2036690	639886	−20.6	−18.6
390	2036697	639902	−20.6	−18.6
395	2036702	639917	−20.9	−18.9
400	2036708	639933	−22.1	−20.1
405	2036714	639948	−22.3	−20.3
410	2036720	639964	−22.6	−20.6
415	2036726	639979	−23.6	−21.6
420	2036731	639994	−22.9	−20.9
425	2036737	640009	−23.6	−21.6
430	2036743	640024	−23.6	−21.6
435	2036749	640040	−23.1	−21.1
440	2036755	640055	−22.9	−20.9
445	2036760	640070	−23.1	−21.1
450	2036766	640086	−23.4	−21.4
455	2036772	640101	−23.1	−21.1
460	2036778	640117	−23.6	−21.6
465	2036784	640132	−23.2	−21.2
470	2036789	640147	−23.6	−21.6
475	2036796	640163	−23.7	−21.7
480	2036801	640178	−23.5	−21.5
485	2036807	640194	−23.0	−21.0
490	2036813	640209	−23.7	−21.7
495	2036819	640224	−24.1	−22.1
500	2036825	640239	−23.7	−21.7
505	2036830	640254	−22.7	−20.7
510	2036836	640270	−23.6	−21.6
515	2036842	640285	−22.7	−20.7
520	2036848	640300	−23.1	−21.1
525	2036854	640316	−22.6	−20.6
530	2036859	640331	−23.3	−21.3
535	2036865	640347	−22.7	−20.7
540	2036871	640362	−23.9	−21.9
545	2036877	640377	−23.5	−21.5
550	2036883	640393	−22.3	−20.3

1993 FOREST PARKBEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N8300

June 18, 1993
Start/End Time: 1158/1205 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2000.000
Low Water Datum [LWD] Correction feet −2.93

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2036073.003	638625.162	6.436	8.496
	2036074.801	638629.841	5.703	7.763
	2036080.164	638644.793	5.201	7.261
	2036087.814	638665.655	3.889	5.949
	2036094.681	638682.838	3.022	5.082
	2036100.143	638696.833	2.147	4.207
	2036103.274	638707.590	1.662	3.722
	2036105.947	638713.633	0.781	2.841
	2036110.736	638725.633	−0.988	1.072
	2036117.582	638742.008	−2.873	−0.813
	2036122.621	638755.127	−3.612	−1.552
	2036124.777	638765.356	−4.327	−2.267
Fathometer Data				
25	2036129	638774	−4.7	−2.7
30	2036135	638789	−4.6	−2.6
35	2036141	638805	−5.4	−3.4
40	2036147	638820	−4.7	−2.7
45	2036153	638835	−4.5	−2.5
50	2036159	638850	−4.6	−2.6
55	2036164	638865	−5.1	−3.1
60	2036170	638881	−5.7	−3.7
65	2036176	638896	−6.6	−4.6
70	2036182	638912	−7.0	−5.0
75	2036188	638927	−7.7	−5.7
80	2036193	638942	−8.0	−6.0
85	2036199	638958	−8.7	−6.7
90	2036205	638973	−9.7	−7.7
95	2036211	638989	−9.6	−7.6
100	2036217	639004	−9.8	−7.8
105	2036222	639019	−9.4	−7.4
110	2036228	639035	−10.0	−8.0
115	2036234	639050	−10.7	−8.7
120	2036240	639065	−11.1	−9.1
125	2036246	639080	−10.7	−8.7
130	2036252	639096	−10.6	−8.6
135	2036257	639111	−11.1	−9.1
140	2036263	639126	−12.9	−10.9
145	2036269	639142	−12.5	−10.5
150	2036275	639157	−13.3	−11.3
155	2036281	639173	−12.8	−10.8
160	2036287	639188	−13.6	−11.6
165	2036292	639203	−13.1	−11.1
170	2036298	639219	−12.7	−10.7
175	2036304	639234	−13.3	−11.3
180	2036310	639250	−13.1	−11.1
185	2036316	639265	−12.4	−10.4
190	2036321	639280	−13.3	−11.3
195	2036327	639295	−14.2	−12.2
200	2036333	639310	−15.7	−13.7
205	2036339	639326	−14.8	−12.8
210	2036345	639341	−15.0	−13.0
215	2036350	639356	−15.7	−13.7
220	2036356	639372	−15.9	−13.9
225	2036362	639387	−16.4	−14.4
230	2036368	639403	−16.0	−14.0
235	2036374	639418	−16.5	−14.5
240	2036380	639433	−17.1	−15.1
245	2036386	639449	−17.5	−15.5
250	2036391	639464	−17.4	−15.4
255	2036397	639480	−17.7	−15.7
260	2036403	639495	−18.2	−16.2
265	2036409	639510	−18.7	−16.7
270	2036415	639525	−19.1	−17.1
275	2036420	639540	−19.2	−17.2
280	2036426	639556	−19.1	−17.1
285	2036432	639571	−19.5	−17.5
290	2036438	639586	−19.2	−17.2
295	2036444	639602	−19.7	−17.7
300	2036449	639617	−20.1	−18.1
305	2036455	639633	−20.6	−18.6
310	2036461	639648	−21.1	−19.1
315	2036467	639663	−20.0	−18.0
320	2036473	639679	−20.7	−18.7
325	2036478	639694	−22.1	−20.1
330	2036485	639710	−21.3	−19.3
335	2036490	639725	−21.3	−19.3
340	2036496	639740	−21.3	−19.3
345	2036502	639755	−21.7	−19.7
350	2036508	639770	−21.6	−19.6
355	2036514	639786	−22.0	−20.0
360	2036519	639801	−21.0	−19.0
365	2036525	639817	−21.2	−19.2
370	2036531	639832	−21.4	−19.4
375	2036537	639847	−21.0	−19.0
380	2036543	639863	−22.2	−20.2
385	2036548	639878	−22.2	−20.2
390	2036554	639894	−21.9	−19.9
395	2036560	639909	−22.9	−20.9
400	2036566	639924	−22.6	−20.6
405	2036572	639940	−22.7	−20.7
410	2036577	639955	−22.6	−20.6
415	2036583	639970	−23.2	−21.2
420	2036589	639985	−23.8	−21.8
425	2036595	640000	−23.7	−21.7
430	2036601	640016	−23.0	−21.0
435	2036607	640031	−22.8	−20.8
440	2036613	640047	−23.5	−21.5
445	2036618	640062	−23.2	−21.2
450	2036624	640077	−23.3	−21.3
455	2036630	640093	−23.6	−21.6
460	2036636	640108	−23.2	−21.2
465	2036642	640124	−23.7	−21.7
470	2036647	640139	−23.1	−21.1
475	2036653	640154	−23.2	−21.2
480	2036659	640170	−22.6	−20.6
485	2036665	640185	−24.3	−22.3
490	2036671	640200	−24.6	−22.6
495	2036676	640215	−23.7	−21.7
500	2036682	640230	−24.1	−22.1
505	2036688	640246	−23.5	−21.5
510	2036694	640261	−23.2	−21.2
515	2036700	640277	−23.5	−21.5
520	2036706	640292	−22.1	−20.1
525	2036711	640307	−23.7	−21.7
530	2036717	640323	−22.2	−20.2
535	2036723	640338	−22.3	−20.3
540	2036729	640354	−22.7	−20.7
545	2036735	640369	−23.1	−21.1
550	2036740	640384	−23.1	−21.1

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N8230

June 18, 1993
Start/End Time: 1112/1121 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2000.000
Low Water Datum [LWD] Correction feet −2.85

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2036008.334	638652.051	7.693	9.753
	2036008.195	638652.168	7.719	9.779
	2036013.351	638666.382	7.012	9.072
	2036020.540	638686.496	5.425	7.485
	2036027.942	638704.247	3.564	5.624
	2036032.241	638716.122	2.429	4.489
	2036034.561	638722.567	2.056	4.116
	2036037.753	638730.632	0.903	2.963
	2036042.737	638743.907	−1.066	0.994
	2036048.170	638759.253	−3.136	−1.076
	2036054.218	638775.228	−4.173	−2.113
Fathometer Data				
20	2036058	638784	−4.7	−2.7
25	2036064	638799	−4.8	−2.7
30	2036070	638814	−4.9	−2.9
35	2036076	638829	−5.0	−3.0
40	2036081	638844	−5.2	−3.2
45	2036087	638860	−5.3	−3.3
50	2036093	638875	−5.5	−3.5
55	2036099	638890	−6.0	−4.0
60	2036105	638906	−6.4	−4.4
65	2036110	638921	−6.8	−4.8
70	2036116	638937	−7.2	−5.2
75	2036122	638952	−7.6	−5.6
80	2036128	638967	−8.2	−6.2
85	2036134	638983	−8.8	−6.8
90	2036140	638998	−9.3	−7.3
95	2036146	639014	−9.5	−7.5
100	2036151	639029	−9.7	−7.7
105	2036157	639044	−9.9	−7.9
110	2036163	639059	−10.1	−8.1
115	2036169	639074	−10.4	−8.4
120	2036175	639090	−10.8	−8.8
125	2036180	639105	−11.1	−9.1
130	2036186	639121	−11.6	−9.6
135	2036192	639136	−11.9	−9.9
140	2036198	639151	−12.2	−10.2
145	2036204	639167	−12.2	−10.2
150	2036209	639182	−13.2	−11.2
155	2036215	639198	−12.8	−10.8
160	2036221	639213	−12.4	−10.4
165	2036227	639228	−13.2	−11.2
170	2036233	639244	−11.6	−9.6
175	2036239	639259	−12.7	−10.7
180	2036245	639274	−11.6	−9.6
185	2036250	639289	−13.7	−11.7
190	2036256	639304	−14.5	−12.5
195	2036262	639320	−15.4	−13.4
200	2036268	639335	−14.7	−12.7
205	2036274	639351	−14.8	−12.8
210	2036279	639366	−15.9	−13.9
215	2036285	639381	−16.2	−14.2
220	2036291	639397	−15.9	−13.9
225	2036297	639412	−15.9	−13.9
230	2036303	639428	−17.0	−15.0
235	2036308	639443	−16.9	−14.9
240	2036314	639458	−17.3	−15.3
245	2036320	639474	−16.5	−14.5
250	2036326	639489	−17.1	−15.1
255	2036332	639504	−17.2	−15.2
260	2036337	639519	−16.8	−14.8
265	2036343	639534	−18.3	−16.3
270	2036349	639550	−19.3	−17.3
275	2036355	639565	−19.7	−17.7
280	2036361	639581	−18.1	−16.1
285	2036367	639596	−18.3	−16.3
290	2036372	639611	−19.4	−17.4
295	2036378	639627	−20.0	−18.0
300	2036384	639642	−20.4	−18.4
305	2036390	639658	−20.7	−18.7
310	2036396	639673	−20.6	−18.6
315	2036401	639688	−20.5	−18.5
320	2036407	639704	−20.4	−18.4
325	2036413	639719	−20.2	−18.2
330	2036419	639734	−20.9	−18.9
335	2036425	639749	−21.2	−19.2
340	2036430	639764	−20.6	−18.6
345	2036436	639780	−20.5	−18.5
350	2036442	639795	−21.8	−19.8
355	2036448	639811	−22.8	−20.8
360	2036454	639826	−20.9	−18.9
365	2036460	639842	−21.5	−19.5
370	2036466	639857	−21.2	−19.2
375	2036471	639872	−22.1	−20.1
380	2036477	639888	−22.3	−20.3
385	2036483	639903	−20.7	−18.7
390	2036489	639919	−23.2	−21.2
395	2036495	639934	−22.7	−20.7
400	2036500	639949	−22.1	−20.1
405	2036506	639964	−23.0	−21.0
410	2036512	639979	−24.2	−22.2
415	2036518	639995	−24.0	−22.0
420	2036524	640010	−23.9	−21.9
425	2036529	640025	−22.7	−20.7
430	2036535	640041	−23.2	−21.2
435	2036541	640056	−20.9	−18.9
440	2036547	640072	−22.7	−20.7
445	2036553	640087	−23.6	−21.6
450	2036558	640102	−23.2	−21.2
455	2036565	640118	−23.7	−21.7
460	2036570	640133	−23.2	−21.2
465	2036576	640149	−23.6	−21.6
470	2036582	640164	−21.6	−19.6
475	2036588	640179	−22.0	−20.0
480	2036594	640194	−23.3	−21.3
485	2036599	640209	−23.6	−21.6
490	2036605	640225	−23.7	−21.7
495	2036611	640240	−23.1	−21.1
500	2036617	640255	−24.0	−22.0
505	2036623	640271	−24.5	−22.5
510	2036628	640286	−23.5	−21.5
515	2036634	640302	−22.6	−20.6
520	2036640	640317	−23.4	−21.4
525	2036646	640332	−23.9	−21.9
530	2036652	640348	−23.6	−21.6
535	2036657	640363	−23.6	−21.6
540	2036663	640379	−23.1	−21.1
545	2036669	640394	−23.0	−21.0
550	2036675	640409	−23.3	−21.3

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N8200

June 18, 1993
Start/End Time: 1059/1106 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2000.000
Low Water Datum [LWD] Correction feet −2.81

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2035980.347	638664.016	9.170	11.230
	2035983.043	638669.843	8.728	10.789
	2035987.608	638681.638	7.808	9.868
	2035993.094	638699.898	6.128	8.188
	2035999.381	638717.029	4.237	6.297
	2036006.208	638731.610	2.650	4.710
	2036011.180	638745.070	1.284	3.344
	2036018.262	638762.288	−1.153	0.907
	2036023.052	638776.310	−3.131	−1.071
	2036027.115	638787.561	−4.029	−1.969
	2036030.669	638800.003	−4.600	−2.540
Fathometer Data				
25	2036036	638809	−4.4	−2.4
30	2036042	638824	−4.8	−2.7
35	2036048	638840	−5.0	−3.0
40	2036053	638855	−5.4	−3.4
45	2036059	638871	−6.1	−4.1
50	2036065	638886	−6.8	−4.8
55	2036071	638901	−7.8	−5.7
60	2036077	638917	−7.3	−5.2
65	2036082	638932	−7.1	−5.1
70	2036088	638948	−6.8	−4.8
75	2036094	638963	−7.3	−5.3
80	2036100	638978	−7.8	−5.7
85	2036106	638993	−7.8	−5.7
90	2036111	639008	−8.5	−6.5
95	2036118	639024	−9.3	−7.3
100	2036123	639039	−9.8	−7.8
105	2036129	639054	−10.1	−8.1
110	2036135	639070	−10.1	−8.1
115	2036141	639085	−10.0	−8.0
120	2036147	639101	−10.8	−8.8
125	2036152	639116	−11.1	−9.1
130	2036158	639132	−11.6	−9.6
135	2036164	639147	−11.1	−9.1
140	2036170	639162	−11.3	−9.3
145	2036176	639178	−12.1	−10.1
150	2036181	639193	−12.8	−10.8
155	2036187	639208	−13.8	−11.7
160	2036193	639223	−12.8	−10.7
165	2036199	639238	−12.3	−10.2
170	2036205	639254	−13.1	−11.1
175	2036210	639269	−13.3	−11.3
180	2036216	639285	−14.0	−12.0
185	2036222	639300	−14.0	−12.0
190	2036228	639315	−14.4	−12.4
195	2036234	639331	−15.8	−13.7
200	2036240	639346	−15.4	−13.4
205	2036246	639362	−14.3	−12.3
210	2036251	639377	−14.9	−12.9
215	2036257	639392	−16.3	−14.3
220	2036263	639408	−15.8	−13.8
225	2036269	639423	−16.4	−14.4
230	2036275	639438	−16.8	−14.7
235	2036280	639453	−18.9	−16.9
240	2036286	639468	−16.6	−14.6
245	2036292	639484	−16.9	−14.9
250	2036298	639499	−17.1	−15.1
255	2036304	639515	−17.8	−15.7
260	2036309	639530	−17.3	−15.2
265	2036315	639545	−19.0	−17.0
270	2036321	639561	−18.8	−16.8
275	2036327	639576	−18.6	−16.6
280	2036333	639592	−19.1	−17.1
285	2036339	639607	−19.5	−17.5
290	2036344	639622	−19.1	−17.1
295	2036350	639638	−20.4	−18.4
300	2036356	639653	−19.3	−17.3
305	2036362	639668	−19.3	−17.2
310	2036368	639683	−20.4	−18.4
315	2036373	639698	−20.1	−18.1
320	2036379	639714	−20.0	−18.0
325	2036385	639729	−20.6	−18.6
330	2036391	639745	−19.5	−17.5
335	2036397	639760	−19.6	−17.6
340	2036402	639775	−20.6	−18.6
345	2036408	639791	−20.3	−18.3
350	2036414	639806	−21.8	−19.8
355	2036420	639822	−20.6	−18.6
360	2036426	639837	−20.3	−18.3
365	2036432	639853	−20.6	−18.6
370	2036437	639868	−21.3	−19.3
375	2036443	639883	−21.8	−19.8
380	2036449	639898	−22.3	−20.2
385	2036455	639913	−22.9	−20.9
390	2036461	639929	−23.0	−21.0
395	2036467	639944	−23.3	−21.3
400	2036472	639959	−22.6	−20.6
405	2036478	639975	−23.0	−21.0
410	2036484	639990	−23.3	−21.2
415	2036490	640006	−23.4	−21.4
420	2036496	640021	−23.4	−21.4
425	2036501	640036	−23.3	−21.3
430	2036507	640052	−23.3	−21.3
435	2036513	640067	−22.5	−20.5
440	2036519	640083	−22.3	−20.3
445	2036525	640098	−22.8	−20.8
450	2036530	640113	−23.4	−21.4
455	2036536	640128	−22.1	−20.1
460	2036542	640143	−23.3	−21.2
465	2036548	640159	−23.5	−21.5
470	2036554	640174	−22.3	−20.2
475	2036560	640189	−23.3	−21.3
480	2036566	640205	−22.8	−20.8
485	2036571	640220	−23.3	−21.3
490	2036577	640236	−24.0	−22.0
495	2036583	640251	−23.4	−21.4
500	2036589	640266	−23.3	−21.3
505	2036595	640282	−23.9	−21.9
510	2036600	640297	−23.8	−21.8
515	2036606	640313	−22.8	−20.8
520	2036612	640328	−23.3	−21.2
525	2036618	640343	−23.1	−21.1
530	2036624	640358	−24.1	−22.1
535	2036629	640373	−23.9	−21.9
540	2036635	640389	−23.0	−21.0
545	2036641	640404	−23.3	−21.3
550	2036647	640419	−22.8	−20.8

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N8030

June 18, 1993
Start/End Time: 1020/1027 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2238.591
Low Water Datum [LWD] Correction feet −2.91

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2035816.580	638709.812	10.021	12.081
	2035824.928	638729.910	9.260	11.320
	2035852.097	638803.059	7.613	9.673
	2035860.225	638830.127	7.092	9.152
	2035860.895	638831.036	6.543	8.603
	2035871.466	638853.598	5.001	7.061
	2035879.877	638877.758	3.592	5.652
	2035887.887	638901.621	2.658	4.718
	2035899.155	638931.110	1.831	3.891
	2035912.836	638960.535	1.405	3.465
	2035917.397	638972.448	1.037	3.097
	2035921.968	638983.558	−0.386	1.674
	2035925.130	638990.838	−2.679	−0.619
	2035926.532	638995.631	−3.819	−1.759
	2035927.543	638998.667	2.763	4.823
	2035929.574	639003.430	6.073	8.133
	2035931.251	639007.786	-7.266	9.326
	2035932.888	639015.027	7.679	9.739
	2035933.012	639015.743	7.694	9.754
	2035934.276	639022.965	6.821	8.881
	2035938.351	639029.420	4.846	6.906
	2035940.375	639033.183	2.670	4.730
	2035943.011	639035.647	−2.828	−0.768
Fathometer Data				
10	2035944	639046	−8.1	−6.1
15	2035950	639062	−8.6	−6.6
20	2035956	639077	−8.4	−6.4
25	2035962	639093	−8.3	−6.3
30	2035967	639108	−8.8	−6.8
35	2035973	639123	−9.1	−7.1
40	2035979	639139	−9.6	−7.6
45	2035985	639154	−10.0	−8.0
50	2035991	639170	−10.4	−8.4
55	2035997	639185	−11.1	−9.1
60	2036002	639200	−12.0	−10.0
65	2036008	639215	−12.1	−10.1
70	2036014	639230	−11.6	−9.6
75	2036020	639246	−12.1	−10.1
80	2036026	639261	−12.3	−10.2
85	2036031	639276	−12.9	−10.9
90	2036037	639292	−12.5	−10.5
95	2036043	639307	−12.8	−10.8
100	2036049	639323	−13.1	−11.1
105	2036055	639338	−13.8	−11.8
110	2036060	639353	−13.9	−11.9
115	2036066	639369	−13.6	−11.6
120	2036072	639384	−13.1	−11.1
125	2036078	639400	−13.4	−11.4
130	2036084	639415	−13.8	−11.7
135	2036090	639430	−14.3	−12.2
140	2036096	639445	−14.0	−12.0
145	2036101	639460	−14.3	−12.3
150	2036107	639476	−14.4	−12.4
155	2036113	639491	−15.6	−13.6
160	2036119	639507	−16.8	−14.7
165	2036125	639522	−17.1	−15.1
170	2036130	639537	−17.8	−15.8
175	2036136	639553	−17.0	−15.0
180	2036142	639568	−16.6	−14.6
185	2036148	639584	−15.5	−13.5
190	2036154	639599	−15.4	−13.4
195	2036159	639614	−15.6	−13.6
200	2036165	639630	−16.5	−14.5
205	2036171	639645	−18.0	−16.0
210	2036177	639660	−18.6	−16.6
215	2036183	639675	−18.0	−16.0
220	2036188	639690	−18.8	−16.7
225	2036194	639706	−19.3	−17.2
230	2036200	639721	−19.9	−17.9
235	2036206	639737	−19.9	−17.9
240	2036212	639752	−20.1	−18.1
245	2036218	639767	−19.6	−17.6
250	2036224	639783	−19.1	−17.1
255	2036229	639798	−19.9	−17.9
260	2036235	639814	−21.3	−19.3
265	2036241	639829	−20.8	−18.7
270	2036247	639844	−20.3	−18.3
275	2036253	639860	−20.1	−18.1
280	2036258	639875	−22.0	−20.0
285	2036264	639890	−21.9	−19.9
290	2036270	639905	−22.4	−20.4
295	2036276	639920	−21.1	−19.1
300	2036282	639936	−22.4	−20.4
305	2036287	639951	−21.6	−19.6
310	2036293	639967	−21.3	−19.2
315	2036299	639982	−21.4	−19.4
320	2036305	639997	−21.6	−19.6
325	2036311	640013	−22.8	−20.7
330	2036317	640028	−22.5	−20.5
335	2036323	640044	−21.3	−19.3
340	2036328	640059	−22.8	−20.7
345	2036334	640074	−22.9	−20.9
350	2036340	640090	−22.6	−20.6
355	2036346	640105	−21.8	−19.7
360	2036352	640120	−22.3	−20.3
365	2036357	640135	−22.4	−20.4
370	2036363	640151	−22.9	−20.9
375	2036369	640166	−22.5	−20.5
380	2036375	640181	−22.8	−20.8
385	2036381	640197	−22.9	−20.9
390	2036386	640212	−23.6	−21.6
395	2036392	640228	−23.1	−21.1
400	2036398	640243	−22.3	−20.3
405	2036404	640258	−22.1	−20.1
410	2036410	640274	−22.0	−20.0
415	2036415	640289	−22.8	−20.8
420	2036422	640305	−22.8	−20.8
425	2036427	640320	−22.3	−20.2
430	2036433	640335	−23.4	−21.4
435	2036439	640350	−23.0	−21.0
440	2036445	640365	−21.5	−19.5
445	2036451	640381	−22.5	−20.5
450	2036456	640396	−20.9	−18.9
455	2036462	640411	−21.6	−19.6
460	2036468	640427	−22.0	−20.0
465	2036474	640442	−21.1	−19.1
470	2036480	640458	−20.8	−18.8
475	2036485	640473	−21.6	−19.6
480	2036491	640488	−21.4	−19.4
485	2036497	640504	−22.5	−20.5
490	2036503	640519	−22.1	−20.1
495	2036509	640535	−22.4	−20.4
500	2036514	640550	−23.8	−21.8
505	2036520	640565	−22.3	−20.2
510	2036526	640581	−22.5	−20.5
515	2036532	640595	−23.1	−21.1
520	2036538	640611	−22.8	−20.8
525	2036544	640626	−22.9	−20.9
530	2036549	640641	−22.1	−20.1
535	2036555	640657	−22.8	−20.8
540	2036561	640672	−22.9	−20.9
545	2036567	640688	−23.3	−21.3
550	2036573	640703	−22.9	−20.9

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N7850

June 18, 1993
Start/End Time: 0100/1006 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2010.000
Low Water Datum [LWD] Correction feet −3.01

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2035680.565	638857.606	6.364	8.424
	2035680.731	638858.497	5.983	8.043
	2035683.030	638868.116	5.434	7.494
	2035689.255	638884.684	4.541	6.601
	2035698.106	638909.990	3.766	5.826
	2035706.503	638928.813	3.173	5.233
	2035711.287	638940.317	2.356	4.416
	2035715.097	638947.722	1.147	3.207
	2035719.934	638962.193	−0.947	1.113
	2035725.407	638976.275	−2.498	−0.438
	2035730.568	638988.780	−3.276	−1.216
	2035734.281	639003.186	−4.087	−2.027
	2035733.703	639013.719	−4.428	−2.368
Fathometer Data				
50	2035741	639019	−4.5	−2.5
55	2035747	639034	−4.8	−2.8
60	2035753	639050	−5.1	−3.1
65	2035759	639065	−5.3	−3.3
70	2035765	639081	−5.4	−3.4
75	2035770	639096	−5.4	−3.4
80	2035776	639111	−5.5	−3.5
85	2035782	639127	−5.8	−3.8
90	2035788	639142	−6.4	−4.4
95	2035794	639158	−7.1	−5.1
100	2035800	639173	−7.8	−5.7
105	2035805	639188	−8.4	−6.4
110	2035811	639204	−8.9	−6.9
115	2035817	639219	−9.4	−7.4
120	2035823	639234	−10.1	−8.1
125	2035829	639249	−10.6	−8.6
130	2035835	639265	−11.3	−9.2
135	2035840	639280	−11.3	−9.2
140	2035846	639295	−12.4	−10.4
145	2035852	639311	−12.5	−10.5
150	2035858	639326	−12.6	−10.6
155	2035864	639342	−12.8	−10.7
160	2035869	639357	−12.6	−10.6
165	2035875	639372	−13.0	−11.0
170	2035881	639388	−13.5	−11.5
175	2035887	639403	−13.9	−11.9
180	2035893	639419	−13.3	−11.2
185	2035898	639434	−13.4	−11.4
190	2035904	639449	−13.3	−11.3
195	2035910	639464	−13.8	−11.8
200	2035916	639479	−14.3	−12.3
205	2035922	639495	−14.0	−12.0
210	2035928	639510	−13.8	−11.8
215	2035933	639525	−13.9	−11.9
220	2035939	639541	−14.0	−12.0
225	2035945	639556	−14.3	−12.3
230	2035951	639572	−14.6	−12.6
235	2035957	639587	−15.3	−13.3
240	2035962	639602	−16.0	−14.0
245	2035968	639618	−17.4	−15.4
250	2035974	639633	−17.3	−15.3
255	2035980	639649	−18.0	−16.0
260	2035986	639664	−17.5	−15.5
265	2035991	639679	−17.4	−15.4
270	2035997	639694	−18.8	−16.7
275	2036003	639709	−18.8	−16.7
280	2036009	639725	−18.6	−16.6
285	2036015	639740	−17.0	−15.0
290	2036021	639755	−17.3	−15.3
295	2036027	639771	−19.1	−17.1
300	2036032	639786	−19.8	−17.7
305	2036038	639802	−20.0	−18.0
310	2036044	639817	−20.5	−18.5
315	2036050	639832	−19.3	−17.3
320	2036056	639848	−20.0	−18.0
325	2036061	639863	−20.8	−18.8
330	2036067	639879	−20.5	−18.5
335	2036073	639894	−20.5	−18.5
340	2036079	639909	−20.8	−18.7
345	2036085	639924	−21.1	−19.1
350	2036090	639939	−21.8	−19.8
355	2036096	639955	−21.4	−19.4
360	2036102	639970	−21.3	−19.2
365	2036108	639986	−20.0	−18.0
370	2036114	640001	−21.4	−19.4
375	2036119	640016	−21.9	−19.9
380	2036126	640032	−22.0	−20.0
385	2036131	640047	−20.6	−18.6
390	2036137	640063	−21.8	−19.8
395	2036143	640078	−22.1	−20.1
400	2036149	640093	−22.0	−20.0
405	2036155	640109	−22.1	−20.1
410	2036160	640124	−21.8	−19.8
415	2036166	640139	−22.5	−20.5
420	2036172	640154	−21.5	−19.5
425	2036178	640169	−22.4	−20.4
430	2036184	640185	−22.9	−20.9
435	2036189	640200	−22.3	−20.3
440	2036195	640216	−23.0	−21.0
445	2036201	640231	−22.6	−20.6
450	2036207	640246	−23.6	−21.6
455	2036213	640262	−23.8	−21.8
460	2036218	640277	−22.6	−20.6
465	2036224	640293	−22.8	−20.7
470	2036230	640308	−22.6	−20.6
475	2036236	640323	−22.3	−20.3
480	2036242	640339	−23.3	−21.3
485	2036248	640354	−22.8	−20.8
490	2036254	640369	−23.5	−21.5
495	2036259	640384	−23.4	−21.4
500	2036265	640399	−23.3	−21.3
505	2036271	640415	−23.5	−21.5
510	2036277	640430	−24.0	−22.0
515	2036283	640446	−23.5	−21.5
520	2036288	640461	−22.8	−20.8
525	2036294	640476	−20.3	−18.3
530	2036300	640492	−21.8	−19.8
535	2036306	640507	−21.5	−19.5
540	2036312	640523	−21.3	−19.2
545	2036317	640538	−21.3	−19.2
550	2036323	640553	−20.8	−18.8

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N7750

June 18, 1993
Start/End Time: 0945/0950 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1990.000
Low Water Datum [LWD] Correction feet −3.01

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2035584.687	638891.962	6.634	8.694
	2035588.562	638902.755	6.418	8.478
	2035588.778	638903.744	6.882	8.942
	2035589.012	638903.829	5.657	7.717
	2035591.662	638912.280	5.220	7.280
	2035597.942	638931.984	4.542	6.602
	2035604.506	638950.039	4.162	6.222
	2035611.072	638967.915	3.400	5.460
	2035614.612	638975.469	2.870	4.930
	2035618.182	638989.039	1.641	3.701
	2035623.400	639003.904	−0.427	1.633
	2035627.995	639016.589	−2.421	−0.361
	2035632.108	639029.715	−3.544	−1.484
	2035637.538	639045.052	−4.139	−2.079
	2035641.120	639064.038	−4.439	−2.379
Fathometer Data				
60	2035652	639067	−4.9	−2.9
65	2035658	639082	−5.3	−3.2
70	2035664	639098	−5.8	−3.7
75	2035670	639113	−6.3	−4.3
80	2035676	639128	−7.3	−5.3
85	2035682	639144	−7.8	−5.7
90	2035687	639159	−8.3	−6.2
95	2035693	639175	−8.5	−6.5
100	2035699	639189	−9.3	−7.2
105	2035705	639204	−9.3	−7.3
110	2035711	639220	−9.3	−7.2
115	2035716	639235	−9.1	−7.1
120	2035722	639251	−9.8	−7.7
125	2035728	639266	−10.0	−8.0
130	2035734	639282	−10.3	−8.3
135	2035740	639297	−10.6	−8.6
140	2035745	639312	−10.8	−8.8
145	2035751	639328	−10.9	−8.9
150	2035757	639343	−11.5	−9.5
155	2035763	639359	−12.6	−10.6
160	2035769	639374	−13.1	−11.1
165	2035774	639389	−13.3	−11.2
170	2035781	639405	−13.8	−11.8
175	2035786	639419	−13.5	−11.5
180	2035792	639435	−13.0	−11.0
185	2035798	639450	−12.8	−10.7
190	2035804	639465	−12.8	−10.8
195	2035810	639481	−12.8	−10.7
200	2035815	639496	−12.9	−10.9
205	2035821	639512	−12.9	−10.9
210	2035827	639527	−13.3	−11.2
215	2035833	639542	−13.4	−11.4
220	2035839	639558	−13.8	−11.7
225	2035844	639573	−14.3	−12.2
230	2035850	639589	−15.0	−13.0
235	2035856	639604	−14.6	−12.6
240	2035862	639619	−15.8	−13.7
245	2035868	639635	−17.3	−15.3
250	2035873	639649	−17.6	−15.6
255	2035879	639665	−18.0	−16.0
260	2035885	639680	−18.0	−16.0
265	2035891	639695	−17.1	−15.1
270	2035897	639711	−16.3	−14.3
275	2035903	639726	−16.3	−14.3
280	2035909	639742	−18.0	−16.0
285	2035914	639757	−17.3	−15.2
290	2035920	639772	−18.3	−16.3
295	2035926	639788	−17.6	−15.6
300	2035932	639803	−20.0	−18.0
305	2035938	639819	−19.0	−17.0
310	2035943	639834	−19.8	−17.7
315	2035949	639849	−19.0	−17.0
320	2035955	639865	−20.3	−18.3
325	2035961	639880	−20.6	−18.6
330	2035967	639895	−20.5	−18.5
335	2035972	639910	−20.4	−18.4
340	2035978	639925	−20.9	−18.9
345	2035984	639941	−20.5	−18.5
350	2035990	639956	−21.0	−19.0
355	2035996	639972	−21.0	−19.0
360	2036002	639987	−20.5	−18.5
365	2036008	640003	−19.6	−17.6
370	2036013	640018	−20.1	−18.1
375	2036019	640033	−21.4	−19.4
380	2036025	640049	−21.8	−19.8
385	2036031	640064	−21.0	−19.0
390	2036037	640080	−21.0	−19.0
395	2036042	640095	−22.0	−20.0
400	2036048	640110	−22.4	−20.4
405	2036054	640125	−22.3	−20.2
410	2036060	640140	−22.4	−20.4
415	2036066	640156	−21.6	−19.6
420	2036071	640171	−22.8	−20.7
425	2036077	640186	−22.3	−20.3
430	2036083	640202	−22.3	−20.2
435	2036089	640217	−22.0	−20.0
440	2036095	640233	−23.4	−21.4
445	2036100	640248	−23.3	−21.2
450	2036106	640263	−23.3	−21.2
455	2036112	640279	−23.5	−21.5
460	2036118	640294	−23.3	−21.3
465	2036124	640310	−23.3	−21.3
470	2036130	640325	−23.0	−21.0
475	2036135	640340	−22.0	−20.0
480	2036141	640355	−22.8	−20.7
485	2036147	640370	−22.3	−20.2
490	2036153	640386	−22.3	−20.2
495	2036159	640401	−22.4	−20.4
500	2036164	640416	−22.9	−20.9
505	2036170	640432	−22.9	−20.9
510	2036176	640447	−23.3	−21.2
515	2036182	640463	−22.4	−20.4
520	2036188	640478	−22.4	−20.4
525	2036193	640493	−22.4	−20.4
530	2036199	640509	−22.0	−20.0
535	2036205	640524	−21.9	−19.9
540	2036211	640540	−22.3	−20.3
545	2036217	640555	−21.4	−19.4
550	2036223	640570	−21.5	−19.5

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N7450

June 17, 1993
Start/End Time: 1447/1457 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2093.000
Low Water Datum [LWD] Correction feet −2.60

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2035302.970	638996.696	6.319	8.379
	2035303.175	638996.881	5.771	7.831
	2035308.895	639010.487	5.447	7.507
	2035313.132	639018.380	4.868	6.928
	2035314.729	639024.593	4.374	6.434
	2035327.062	639053.255	2.994	5.054
	2035329.715	639061.800	2.613	4.673
	2035332.142	639068.862	2.495	4.555
	2035336.427	639080.022	1.782	3.842
	2035339.517	639087.127	0.761	2.821
	2035346.433	639103.816	−1.593	0.467
	2035353.773	639122.084	−1.978	0.082
	2035364.261	639148.821	−2.489	−0.429
	2035371.850	639168.931	−2.885	−0.825
	2035383.805	639201.249	−3.203	−1.143
	2035391.883	639224.501	−4.367	−2.307
Fathometer Data				
50	2035397	639239	−5.5	−3.4
55	2035402	639254	−7.2	−5.1
60	2035408	639270	−7.1	−5.0
65	2035414	639285	−7.0	−4.9
70	2035420	639301	−7.0	−4.9
75	2035426	639316	−7.5	−5.4
80	2035432	639331	−8.3	−6.2
85	2035438	639346	−9.0	−6.9
90	2035443	639361	−10.1	−8.0
95	2035449	639377	−10.2	−8.1
100	2035455	639392	−10.4	−8.3
105	2035461	639407	−10.7	−8.6
110	2035467	639423	−11.5	−9.4
115	2035472	639438	−12.8	−10.7
120	2035478	639454	−13.3	−11.2
125	2035484	639469	−13.0	−10.9
130	2035490	639485	−12.9	−10.8
135	2035496	639500	−12.9	−10.8
140	2035501	639515	−12.7	−10.6
145	2035507	639531	−12.6	−10.5
150	2035513	639546	−12.7	−10.6
155	2035519	639561	−13.5	−11.4
160	2035525	639576	−13.0	−10.9
165	2035531	639591	−13.8	−11.7
170	2035537	639607	−14.5	−12.4
175	2035542	639622	−15.5	−13.4
180	2035548	639638	−16.5	−14.4
185	2035554	639653	−17.0	−14.9
190	2035560	639668	−17.0	−14.9
195	2035566	639684	−16.9	−14.8
200	2035571	639699	−16.3	−14.2
205	2035577	639715	−16.6	−14.5
210	2035583	639730	−16.0	−13.9
215	2035589	639745	−16.5	−14.4
220	2035595	639761	−16.9	−14.8
225	2035600	639776	−17.1	−15.0
230	2035606	639791	−17.0	−14.9
235	2035612	639806	−17.9	−15.8
240	2035618	639821	−18.7	−16.6
245	2035624	639837	−18.3	−16.2
250	2035629	639852	−18.5	−16.4
255	2035636	639868	−19.0	−16.9
260	2035641	639883	−19.1	−17.0
265	2035647	639898	−18.6	−16.5
270	2035653	639914	−19.1	−17.0
275	2035659	639929	−19.4	−17.3
280	2035665	639945	−19.5	−17.4
285	2035670	639960	−19.5	−17.4
290	2035676	639975	−19.9	−17.8
295	2035682	639991	−19.6	−17.5
300	2035688	640006	−20.3	−18.2
305	2035694	640021	−20.0	−17.9
310	2035699	640036	−20.5	−18.4
315	2035705	640051	−20.5	−18.4
320	2035711	640067	−20.2	−18.1
325	2035717	640082	−19.8	−17.7
330	2035723	640098	−20.3	−18.2
335	2035728	640113	−20.8	−18.7
340	2035734	640128	−20.3	−18.2
345	2035740	640144	−20.0	−17.9
350	2035746	640159	−20.9	−18.8
355	2035752	640175	−21.1	−19.0
360	2035758	640190	−21.2	−19.1
365	2035764	640206	−20.6	−18.5
370	2035769	640221	−20.5	−18.4
375	2035775	640236	−20.3	−18.2
380	2035781	640251	−19.0	−16.9
385	2035787	640266	−19.3	−17.2
390	2035793	640282	−20.0	−17.9
395	2035798	640297	−19.7	−17.6
400	2035804	640312	−20.3	−18.2
405	2035810	640328	−20.1	−18.0
410	2035816	640343	−20.1	−18.0
415	2035822	640359	−20.0	−17.9
420	2035827	640374	−20.5	−18.4
425	2035833	640389	−19.9	−17.8
430	2035839	640405	−20.6	−18.5
435	2035845	640420	−20.8	−18.7
440	2035851	640436	−21.5	−19.4
445	2035857	640451	−21.0	−18.9
450	2035862	640466	−20.7	−18.6
455	2035868	640481	−20.2	−18.1
460	2035874	640496	−20.7	−18.6
465	2035880	640512	−20.5	−18.4
470	2035886	640527	−20.3	−18.2
475	2035891	640542	−19.8	−17.7
480	2035897	640558	−20.7	−18.6
485	2035903	640573	−20.6	−18.5
490	2035909	640589	−21.4	−19.3
495	2035915	640604	−22.3	−20.2
500	2035920	640619	−21.9	−19.8
505	2035926	640635	−22.3	−20.2
510	2035932	640650	−23.0	−20.9
515	2035938	640666	−22.8	−20.7
520	2035944	640681	−22.7	−20.6
525	2035949	640696	−22.4	−20.3
530	2035956	640711	−21.9	−19.8
535	2035961	640726	−22.4	−20.3
540	2035967	640742	−21.8	−19.7
545	2035973	640757	−21.1	−19.0
550	2035979	640772	−21.8	−19.7

1993 FOREST PARKBEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N7350

June 17, 1993
Start/End Time: 1429/1438 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2066.000
Low Water Datum [LWD] Correction feet −2.78

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2035203.061	639011.377	6.700	8.760
	2035203.192	639011.859	4.887	6.947
	2035207.418	639025.810	4.765	6.825
	2035213.412	639040.982	4.055	6.115
	2035218.910	639053.386	3.503	5.563
	2035223.520	639063.571	3.423	5.483
	2035223.445	639063.874	3.214	5.274
	2035231.950	639086.578	2.612	4.672
	2035234.193	639092.112	2.245	4.305
	2035237.282	639099.083	0.989	3.049
	2035240.416	639109.698	−0.557	1.503
	2035245.564	639123.131	−1.633	0.427
	2035255.532	639148.923	−3.106	−1.046
	2035261.314	639166.201	−3.668	−1.608
	2035268.284	639184.059	−3.834	−1.774
	2035275.484	639202.988	−4.005	−1.945
Fathometer Data				
35	2035276	639203	−4.1	−2.0
40	2035282	639218	−4.5	−2.4
45	2035288	639234	−4.6	−2.5
50	2035294	639249	−4.8	−2.7
55	2035299	639264	−4.9	−2.8
60	2035305	639280	−5.0	−2.9
65	2035311	639295	−5.4	−3.3
70	2035317	639311	−5.8	−3.7
75	2035323	639326	−6.4	−4.3
80	2035328	639341	−7.1	−5.0
85	2035335	639357	−7.7	−5.6
90	2035340	639372	−8.3	−6.2
95	2035346	639387	−8.8	−6.7
100	2035352	639402	−9.1	−7.0
105	2035358	639417	−9.3	−7.2
110	2035364	639433	−9.6	−7.5
115	2035369	639448	−9.9	−7.8
120	2035375	639464	−10.1	−8.0
125	2035381	639479	−10.3	−8.2
130	2035387	639495	−10.6	−8.5
135	2035393	639510	−10.9	−8.8
140	2035398	639525	−11.7	−9.6
145	2035404	639541	−12.2	−10.1
150	2035410	639556	−13.2	−11.1
155	2035416	639572	−13.4	−11.3
160	2035422	639587	−13.1	−11.0
165	2035427	639602	−12.8	−10.7
170	2035433	639617	−12.7	−10.6
175	2035439	639632	−12.7	−10.6
180	2035445	639648	−12.6	−10.5
185	2035451	639663	−12.5	−10.4
190	2035457	639678	−12.4	−10.3
195	2035463	639694	−12.5	−10.4
200	2035468	639709	−12.7	−10.6
205	2035474	639725	−13.1	−11.0
210	2035480	639740	−14.0	−11.9
215	2035486	639755	−15.0	−12.9
220	2035492	639771	−16.1	−14.0
225	2035497	639786	−16.7	−14.6
230	2035503	639802	−17.5	−15.4
235	2035509	639817	−17.4	−15.3
240	2035515	639832	−17.2	−15.1
245	2035521	639847	−17.9	−15.8
250	2035526	639862	−17.4	−15.3
255	2035532	639878	−18.2	−16.1
260	2035538	639893	−18.3	−16.2
265	2035544	639908	−18.3	−16.2
270	2035550	639924	−18.4	−16.3
275	2035556	639939	−18.6	−16.5
280	2035562	639955	−18.1	−16.0
285	2035567	639970	−17.6	−15.5
290	2035573	639985	−17.9	−15.8
295	2035579	640001	−19.3	−17.2
300	2035585	640016	−20.0	−17.9
305	2035591	640032	−19.8	−17.7
310	2035596	640047	−19.1	−17.0
315	2035602	640062	−18.8	−16.7
320	2035608	640077	−19.3	−17.2
325	2035614	640092	−19.8	−17.7
330	2035620	640108	−20.4	−18.3
335	2035625	640123	−21.1	−19.0
340	2035631	640138	−20.7	−18.6
345	2035637	640154	−20.0	−17.9
350	2035643	640169	−21.1	−19.0
355	2035649	640185	−21.5	−19.4
360	2035654	640200	−20.4	−18.3
365	2035661	640216	−21.8	−19.7
370	2035666	640231	−21.0	−18.9
375	2035672	640246	−19.9	−17.8
380	2035678	640262	−20.7	−18.6
385	2035684	640277	−20.6	−18.5
390	2035690	640293	−20.9	−18.8
395	2035695	640307	−20.8	−18.7
400	2035701	640322	−21.3	−19.2
405	2035707	640338	−22.0	−19.9
410	2035713	640353	−21.2	−19.1
415	2035719	640369	−20.5	−18.4
420	2035724	640384	−20.6	−18.5
425	2035730	640399	−20.0	−17.9
430	2035736	640415	−19.4	−17.3
435	2035742	640430	−19.1	−17.0
440	2035748	640446	−19.0	−16.9
445	2035753	640461	−19.4	−17.3
450	2035759	640476	−20.3	−18.2
455	2035765	640492	−20.1	−18.0
460	2035771	640507	−19.8	−17.7
465	2035777	640523	−20.7	−18.6
470	2035783	640537	−20.6	−18.5
475	2035788	640552	−20.6	−18.5
480	2035794	640568	−20.9	−18.8
485	2035800	640583	−21.3	−19.2
490	2035806	640599	−20.8	−18.7
495	2035812	640614	−20.8	−18.7
500	2035817	640629	−21.1	−19.0
505	2035823	640645	−21.3	−19.2
510	2035829	640660	−21.5	−19.4
515	2035835	640676	−21.4	−19.3
520	2035841	640691	−20.6	−18.5
525	2035846	640706	−20.3	−18.2
530	2035852	640722	−20.7	−18.6
535	2035858	640737	−21.3	−19.2
540	2035864	640753	−21.4	−19.3
545	2035870	640767	−20.9	−18.8
550	2035875	640782	−20.3	−18.2
555	2035882	640798	−20.3	−18.2
560	2035887	640813	−20.8	−18.7
565	2035893	640829	−21.5	−19.4
570	2035899	640844	−21.2	−19.1
575	2035905	640859	−21.1	−19.0
580	2035911	640875	−21.5	−19.4
585	2035916	640890	−21.9	−19.8
590	2035922	640906	−22.3	−20.2

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N7000

June 17, 1993
Start/End Time: 1350/1401 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2000.000
Low Water Datum [LWD] Correction feet −2.96

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2034837.000	639032.608	7.795	9.855
	2034842.458	639052.450	6.819	8.879
	2034845.428	639063.847	6.536	8.596
	2034845.863	639064.668	7.058	9.118
	2034845.738	639064.904	5.362	7.422
	2034849.506	639078.672	5.401	7.461
	2034852.262	639085.580	5.408	7.468
	2034862.435	639100.108	5.467	7.527
	2034869.597	639118.005	5.335	7.395
	2034878.203	639138.667	4.413	6.473
	2034883.752	639154.258	3.905	5.965
	2034888.189	639168.623	3.040	5.100
	2034893.769	639182.006	2.116	4.176
	2034896.172	639190.703	1.202	3.262
	2034902.296	639202.458	−0.545	1.515
	2034907.075	639216.547	−1.609	0.451
	2034913.403	639237.249	−2.693	−0.633
	2034923.574	639259.752	−3.302	−1.242
	2034933.270	639281.523	−3.984	−1.924
	2034939.294	639294.483	−4.513	−2.453
Fathometer Data				
45	2034937	639297	−4.6	−2.5
50	2034943	639312	−5.0	−2.9
55	2034949	639327	−5.5	−3.4
60	2034955	639342	−6.4	−4.3
65	2034960	639357	−6.9	−4.8
70	2034966	639373	−7.1	−5.0
75	2034972	639388	−7.3	−5.2
80	2034978	639403	−8.0	−5.9
85	2034984	639419	−9.1	−7.0
90	2034990	639434	−10.0	−7.9
95	2034996	639450	−10.6	−8.5
100	2035001	639465	−11.2	−9.1
105	2035007	639480	−11.8	−9.7
110	2035013	639496	−12.8	−10.7
115	2035019	639511	−13.3	−11.2
120	2035025	639527	−12.9	−10.8
125	2035030	639542	−12.3	−10.2
130	2035036	639557	−11.8	−9.7
135	2035042	639572	−11.5	−9.4
140	2035048	639587	−11.2	−9.1
145	2035054	639603	−11.1	−9.0
150	2035059	639618	−11.1	−9.0
155	2035065	639634	−11.2	−9.1
160	2035071	639649	−11.3	−9.2
165	2035077	639664	−11.4	−9.3
170	2035083	639680	−11.6	−9.5
175	2035089	639695	−11.7	−9.6
180	2035095	639711	−12.0	−9.9
185	2035100	639726	−12.1	−10.0
190	2035106	639741	−12.4	−10.3
195	2035112	639757	−12.6	−10.5
200	2035118	639772	−12.8	−10.7
205	2035124	639787	−13.3	−11.2
210	2035129	639802	−14.8	−12.7
215	2035135	639817	−15.6	−13.5
220	2035141	639833	−15.9	−13.8
225	2035147	639848	−16.2	−14.1
230	2035153	639864	−16.4	−14.3
235	2035158	639879	−16.8	−14.7
240	2035164	639894	−17.1	−15.0
245	2035170	639910	−16.5	−14.4
250	2035176	639925	−17.5	−15.4
255	2035182	639941	−17.3	−15.2
260	2035187	639956	−17.7	−15.6
265	2035193	639971	−18.7	−16.6
270	2035199	639987	−17.9	−15.8
275	2035205	640002	−18.0	−15.9
280	2035211	640017	−17.8	−15.7
285	2035217	640032	−17.7	−15.6
290	2035222	640047	−18.0	−15.9
295	2035228	640063	−18.6	−16.5
300	2035234	640078	−18.7	−16.6
305	2035240	640094	−18.4	−16.3
310	2035246	640109	−18.1	−16.0
315	2035251	640124	−17.9	−15.8
320	2035257	640140	−18.5	−16.4
325	2035263	640155	−19.1	−17.0
330	2035269	640171	−19.1	−17.0
335	2035275	640186	−19.1	−17.0
340	2035280	640201	−19.6	−17.5
345	2035286	640217	−19.8	−17.7
350	2035292	640232	−20.0	−17.9
355	2035298	640247	−20.6	−18.5
360	2035304	640262	−20.6	−18.5
365	2035310	640278	−20.2	−18.1
370	2035316	640293	−19.5	−17.4
375	2035321	640308	−19.1	−17.0
380	2035327	640324	−19.8	−17.7
385	2035333	640339	−20.1	−18.0
390	2035339	640355	−20.2	−18.1
395	2035345	640370	−20.1	−18.0
400	2035350	640385	−19.5	−17.4
405	2035356	640401	−20.1	−18.0
410	2035362	640416	−20.1	−18.0
415	2035368	640432	−20.7	−18.6
420	2035374	640447	−20.6	−18.5
425	2035379	640462	−20.9	−18.8
430	2035385	640477	−20.9	−18.8
435	2035391	640492	−20.8	−18.7
440	2035397	640508	−21.0	−18.9
445	2035403	640523	−21.3	−19.2
450	2035408	640538	−21.6	−19.5
455	2035415	640554	−21.7	−19.6
460	2035420	640569	−21.9	−19.8
465	2035426	640585	−21.8	−19.7
470	2035432	640600	−21.3	−19.2
475	2035438	640615	−21.5	−19.4
480	2035444	640631	−21.6	−19.5
485	2035449	640646	−22.1	−20.0
490	2035455	640662	−21.1	−19.0
495	2035461	640677	−21.0	−18.9
500	2035467	640692	−21.0	−18.9
505	2035473	640707	−21.1	−19.0
510	2035478	640722	−21.0	−18.9
515	2035484	640738	−21.1	−19.0
520	2035490	640753	−21.3	−19.2
525	2035496	640768	−19.8	−17.7
530	2035502	640784	−20.9	−18.8
535	2035507	640799	−21.1	−19.0
540	2035513	640815	−21.2	−19.1
545	2035519	640830	−21.3	−19.2
550	2035525	640845	−21.2	−19.1

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N6900

June 17, 1993
Start/End Time: 1331/1342 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2000.000
Low Water Datum [LWD] Correction feet −3.00

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2034743.024	639068.453	6.718	8.778
	2034747.539	639078.786	6.458	8.518
	2034747.863	639079.518	7.051	9.111
	2034745.326	639080.775	5.127	7.188
	2034754.620	639096.401	4.665	6.725
	2034763.325	639117.727	4.656	6.716
	2034771.171	639137.559	4.121	6.181
	2034779.929	639160.946	3.704	5.764
	2034786.959	639179.191	3.841	5.901
	2034791.482	639193.536	2.974	5.034
	2034794.268	639201.479	2.418	4.478
	2034797.372	639210.839	0.866	2.926
	2034802.518	639224.492	−1.279	0.781
	2034810.257	639246.219	−3.112	−1.052
	2034816.287	639259.643	−3.998	−1.938
	2034822.725	639275.885	−4.517	−2.457
Fathometer Data				
30	2034826	639285	−5.1	−3.0
35	2034832	639301	−5.5	−3.4
40	2034838	639316	−5.9	−3.8
45	2034844	639332	−6.2	−4.1
50	2034850	639347	−6.6	−4.5
55	2034855	639362	−7.0	−4.9
60	2034861	639378	−7.5	−5.4
65	2034867	639393	−8.0	−5.9
70	2034873	639409	−8.5	−6.4
75	2034879	639424	−9.1	−7.0
80	2034884	639439	−9.6	−7.5
85	2034890	639455	−10.2	−8.1
90	2034896	639470	−10.8	−8.7
95	2034902	639485	−11.8	−9.7
100	2034908	639500	−12.4	−10.3
105	2034913	639515	−12.6	−10.5
110	2034919	639531	−13.3	−11.2
115	2034925	639546	−13.5	−11.4
120	2034931	639562	−13.2	−11.1
125	2034937	639577	−13.6	−11.5
130	2034943	639593	−13.1	−11.0
135	2034949	639608	−13.1	−11.0
140	2034954	639623	−12.5	−10.4
145	2034960	639639	−12.3	−10.2
150	2034966	639654	−12.2	−10.1
155	2034972	639670	−12.1	−10.0
160	2034978	639685	−12.1	−10.0
165	2034983	639700	−12.2	−10.1
170	2034989	639715	−12.2	−10.1
175	2034995	639730	−12.5	−10.4
180	2035001	639746	−12.8	−10.7
185	2035007	639761	−13.2	−11.1
190	2035012	639776	−14.1	−12.0
195	2035018	639792	−14.6	−12.5
200	2035024	639807	−14.9	−12.8
205	2035030	639823	−14.8	−12.7
210	2035036	639838	−15.2	−13.1
215	2035041	639853	−16.1	−14.0
220	2035048	639869	−16.8	−14.7
225	2035053	639884	−16.9	−14.8
230	2035059	639900	−16.7	−14.6
235	2035065	639915	−16.3	−14.2
240	2035071	639930	−16.4	−14.3
245	2035077	639945	−16.6	−14.5
250	2035082	639960	−16.7	−14.6
255	2035088	639976	−16.4	−14.3
260	2035094	639991	−16.6	−14.5
265	2035100	640006	−17.3	−15.2
270	2035106	640022	−17.2	−15.1
275	2035111	640037	−17.3	−15.2
280	2035117	640053	−17.0	−14.9
285	2035123	640068	−17.1	−15.0
290	2035129	640083	−17.3	−15.2
295	2035135	640099	−18.1	−16.0
300	2035140	640114	−18.7	−16.6
305	2035146	640130	−18.8	−16.7
310	2035152	640145	−18.5	−16.4
315	2035158	640160	−19.1	−17.0
320	2035164	640175	−19.4	−17.3
325	2035170	640190	−19.3	−17.2
330	2035176	640206	−18.9	−16.8
335	2035181	640221	−19.1	−17.0
340	2035187	640236	−19.6	−17.5
345	2035193	640252	−19.8	−17.7
350	2035199	640267	−19.9	−17.8
355	2035205	640283	−20.1	−18.0
360	2035210	640298	−20.3	−18.2
365	2035216	640314	−20.3	−18.2
370	2035222	640329	−19.9	−17.8
375	2035228	640344	−19.8	−17.7
380	2035234	640360	−20.0	−17.9
385	2035239	640375	−20.1	−18.0
390	2035245	640390	−20.6	−18.5
395	2035251	640405	−20.5	−18.4
400	2035257	640420	−19.6	−17.5
405	2035263	640436	−19.4	−17.3
410	2035269	640451	−19.7	−17.6
415	2035275	640467	−20.6	−18.5
420	2035280	640482	−20.7	−18.6
425	2035286	640497	−20.0	−17.9
430	2035292	640513	−20.1	−18.0
435	2035298	640528	−20.5	−18.4
440	2035304	640544	−20.7	−18.6
445	2035309	640559	−20.9	−18.8
450	2035315	640574	−21.1	−19.0
455	2035321	640590	−21.2	−19.1
460	2035327	640605	−21.3	−19.2
465	2035333	640620	−21.5	−19.4
470	2035338	640635	−21.8	−19.7
475	2035344	640650	−21.8	−19.7
480	2035350	640666	−21.2	−19.1
485	2035356	640681	−20.8	−18.7
490	2035362	640697	−21.1	−19.0
495	2035367	640712	−21.1	−19.0
500	2035373	640727	−21.1	−19.0
505	2035379	640743	−20.9	−18.8
510	2035385	640758	−20.9	−18.8
515	2035391	640774	−21.0	−18.9
520	2035397	640789	−21.0	−18.9
525	2035402	640804	−20.3	−18.2
530	2035408	640820	−20.4	−18.3
535	2035414	640835	−21.1	−19.0
540	2035420	640850	−21.3	−19.2
545	2035426	640865	−21.3	−19.2
550	2035431	640880	−20.6	−18.5
555	2035437	640896	−20.4	−18.3
560	2035443	640911	−21.1	−19.0
565	2035449	640927	−21.4	−19.3
570	2035455	640942	−21.0	−18.9
575	2035460	640957	−20.5	−18.4
580	2035466	640973	−20.9	−18.8
585	2035472	640988	−21.3	−19.2
590	2035478	641004	−21.0	−18.9
595	2035484	641019	−21.5	−19.4
600	2035490	641035	−21.6	−19.5
605	2035496	641050	−21.9	−19.8
610	2035501	641065	−22.3	−20.2

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N6417

June 17, 1993
Start/End Time: 1104/1112 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2228.007
Low Water Datum [LWD] Correction feet −2.98

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2034324.884	639326.037	5.852	7.912
	2034329.069	639335.036	5.652	7.712
	2034333.703	639347.254	5.405	7.465
	2034334.724	639348.405	−4.802	−2.742
	2034340.495	639358.106	−6.074	−4.014
	2034349.813	639380.074	−6.100	−4.040
	2034360.490	639405.187	−6.975	−4.915
	2034369.112	639425.586	−7.154	−5.094
	2034376.849	639450.179	−7.859	−5.799
	2034383.704	639470.218	−6.153	−4.093
	2034394.193	639490.913	−7.930	−5.870
	2034402.095	639502.804	−8.197	−6.137
	2034406.102	639523.545	−5.668	−3.608
	2034412.164	639542.604	−2.505	−0.445
	2034415.661	639544.210	0.333	2.393
	2034413.834	639551.591	3.779	5.839
	2034415.937	639561.951	6.738	8.798
	2034419.146	639569.710	10.364	12.424
	2034423.128	639577.305	8.931	10.991
	2034425.561	639583.742	6.903	8.963
	2034427.556	639588.431	4.153	6.213
	2034427.844	639591.896	1.305	3.365
	2034427.226	639594.638	−2.972	−0.912
Fathometer Data				
10	2034432	639609	−6.1	−4.0
15	2034438	639624	−10.5	−8.4
20	2034444	639640	−11.3	−9.2
25	2034450	639655	−11.9	−9.8
30	2034455	639670	−12.4	−10.3
35	2034461	639686	−12.7	−10.6
40	2034467	639701	−13.2	−11.1
45	2034473	639717	−13.5	−11.4
50	2034479	639732	−13.6	−11.5
55	2034485	639747	−13.6	−11.5
60	2034491	639762	−13.7	−11.6
65	2034496	639777	−13.7	−11.6
70	2034502	639793	−13.6	−11.5
75	2034508	639808	−13.6	−11.5
80	2034514	639823	−13.7	−11.6
85	2034520	639839	−13.7	−11.6
90	2034525	639854	−13.8	−11.7
95	2034531	639870	−13.7	−11.6
100	2034537	639885	−14.0	−11.9
105	2034543	639900	−14.2	−12.1
110	2034549	639916	−14.4	−12.3
115	2034554	639931	−14.5	−12.4
120	2034560	639947	−14.6	−12.5
125	2034566	639962	−14.6	−12.5
130	2034572	639977	−14.7	−12.6
135	2034578	639992	−14.7	−12.6
140	2034584	640007	−14.8	−12.7
145	2034590	640023	−14.8	−12.7
150	2034595	640038	−14.8	−12.7
155	2034601	640054	−15.2	−13.1
160	2034607	640069	−15.7	−13.6
165	2034613	640084	−15.8	−13.7
170	2034619	640100	−15.8	−13.7
175	2034624	640115	−16.2	−14.1
180	2034630	640131	−16.6	−14.5
185	2034636	640146	−16.4	−14.3
190	2034642	640161	−16.5	−14.4
195	2034648	640177	−16.5	−14.4
200	2034653	640192	−16.7	−14.6
205	2034659	640207	−16.8	−14.7
210	2034665	640222	−16.7	−14.6
215	2034671	640237	−16.6	−14.5
220	2034677	640253	−17.2	−15.1
225	2034682	640268	−17.4	−15.3
230	2034689	640284	−17.5	−15.4
235	2034694	640299	−17.9	−15.8
240	2034700	640314	−18.1	−16.0
245	2034706	640330	−17.6	−15.5
250	2034712	640345	−17.4	−15.3
255	2034718	640361	−17.5	−15.4
260	2034723	640376	−17.9	−15.8
265	2034729	640391	−18.5	−16.4
270	2034735	640407	−18.7	−16.6
275	2034741	640422	−18.6	−16.5
280	2034747	640437	−18.6	−16.5
285	2034752	640452	−18.7	−16.6
290	2034758	640467	−18.2	−16.1
295	2034764	640483	−18.5	−16.4
300	2034770	640498	−18.7	−16.6
305	2034776	640514	−18.6	−16.5
310	2034781	640529	−19.0	−16.9
315	2034787	640544	−18.9	−16.8
320	2034793	640560	−19.2	−17.1
325	2034799	640575	−18.5	−16.4
330	2034805	640591	−19.1	−17.0
335	2034811	640606	−20.0	−17.9
340	2034816	640621	−19.9	−17.8
345	2034822	640637	−19.7	−17.6
350	2034828	640652	−19.6	−17.5
355	2034834	640667	−20.0	−17.9
360	2034840	640682	−20.3	−18.2
365	2034846	640698	−20.2	−18.1
370	2034851	640713	−20.0	−17.9
375	2034857	640728	−20.4	−18.3
380	2034863	640744	−20.0	−17.9
385	2034869	640759	−20.1	−18.0
390	2034875	640775	−20.5	−18.4
395	2034880	640790	−20.6	−18.5
400	2034886	640805	−20.6	−18.5
405	2034892	640821	−21.3	−19.2
410	2034898	640836	−21.7	−19.6
415	2034904	640852	−20.8	−18.7
420	2034910	640867	−20.6	−18.5
425	2034915	640882	−21.1	−19.0
430	2034921	640897	−21.3	−19.2
435	2034927	640912	−21.2	−19.1
440	2034933	640928	−21.5	−19.4
445	2034939	640943	−21.8	−19.7
450	2034944	640958	−22.1	−20.0
455	2034950	640974	−22.4	−20.3
460	2034956	640989	−22.5	−20.4
465	2034962	641005	−22.5	−20.4
470	2034968	641020	−22.6	−20.5
475	2034973	641035	−22.7	−20.6
480	2034979	641051	−22.9	−20.8
485	2034985	641066	−23.0	−20.9
490	2034991	641082	−22.9	−20.8
495	2034997	641097	−22.5	−20.4
500	2035002	641112	−22.5	−20.4
505	2035008	641127	−22.9	−20.8
510	2035014	641142	−22.3	−20.2
515	2035020	641158	−22.3	−20.2
520	2035026	641173	−22.6	−20.5
525	2035032	641188	−21.2	−19.1
530	2035038	641204	−21.4	−19.3
535	2035043	641219	−22.5	−20.4
540	2035049	641235	−22.1	−20.0
545	2035055	641250	−21.5	−19.4
550	2035061	641265	−21.9	−19.8

1993 FOREST PARKBEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N6217

June 17, 1993
Start/End Time: 1021/1032 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2000.197
Low Water Datum [LWD] Correction feet −2.91

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2034144.025	639412.869	7.664	9.724
	2034148.732	639425.086	8.298	10.358
	2034152.969	639435.645	8.106	10.166
	2034152.876	639436.188	9.365	11.425
	2034155.777	639439.903	9.152	11.212
	2034157.151	639447.311	7.214	9.274
	2034159.703	639454.195	4.471	6.531
	2034160.028	639458.626	3.288	5.348
	2034160.846	639459.816	−1.943	0.117
Fathometer Data				
10	2034165	639467	−5.0	−3.0
15	2034170	639482	−5.1	−3.1
20	2034176	639498	−5.6	−3.6
25	2034182	639513	−5.8	−3.8
30	2034188	639529	−6.3	−4.3
35	2034194	639544	−6.9	−4.9
40	2034199	639558	−7.5	−5.5
45	2034205	639574	−7.9	−5.9
50	2034211	639589	−7.8	−5.8
55	2034217	639605	−7.6	−5.6
60	2034223	639620	−7.5	−5.5
65	2034228	639635	−7.6	−5.6
70	2034234	639651	−8.0	−6.0
75	2034240	639666	−8.6	−6.6
80	2034246	639682	−9.4	−7.4
85	2034252	639697	−10.3	−8.2
90	2034257	639712	−11.1	−9.1
95	2034263	639728	−11.5	−9.5
100	2034269	639743	−12.1	−10.1
105	2034275	639759	−12.8	−10.7
110	2034281	639774	−12.8	−10.8
115	2034287	639788	−12.8	−10.7
120	2034293	639804	−12.8	−10.7
125	2034298	639819	−12.8	−10.8
130	2034304	639835	−13.1	−11.1
135	2034310	639850	−13.3	−11.2
140	2034316	639866	−13.3	−11.3
145	2034322	639881	−13.4	−11.4
150	2034327	639896	−13.4	−11.4
155	2034333	639912	−13.4	−11.4
160	2034339	639927	−13.3	−11.3
165	2034345	639943	−13.4	−11.4
170	2034351	639958	−13.6	−11.6
175	2034356	639973	−13.8	−11.7
180	2034362	639989	−13.8	−11.8
185	2034368	640004	−13.9	−11.9
190	2034374	640019	−14.1	−12.1
195	2034380	640034	−14.5	−12.5
200	2034386	640049	−14.8	−12.7
205	2034392	640065	−14.3	−12.3
210	2034397	640080	−14.3	−12.2
215	2034403	640096	−14.5	−12.5
220	2034409	640111	−15.0	−13.0
225	2034415	640126	−15.4	−13.4
230	2034421	640142	−15.3	−13.2
235	2034426	640157	−14.8	−12.7
240	2034432	640173	−15.1	−13.1
245	2034438	640188	−15.6	−13.6
250	2034444	640203	−16.1	−14.1
255	2034450	640219	−16.5	−14.5
260	2034455	640234	−16.8	−14.7
265	2034461	640249	−16.5	−14.5
270	2034467	640264	−15.8	−13.8
275	2034473	640279	−16.1	−14.1
280	2034479	640295	−16.3	−14.2
285	2034484	640310	−15.4	−13.4
290	2034491	640326	−15.3	−13.3
295	2034496	640341	−15.8	−13.8
300	2034502	640356	−16.3	−14.3
305	2034508	640372	−16.4	−14.4
310	2034514	640387	−16.3	−14.3
315	2034520	640403	−16.5	−14.5
320	2034525	640418	−16.8	−14.8
325	2034531	640433	−16.8	−14.8
330	2034537	640449	−17.3	−15.2
335	2034543	640464	−16.6	−14.6
340	2034549	640479	−17.5	−15.5
345	2034554	640494	−17.5	−15.5
350	2034560	640509	−17.5	−15.5
355	2034566	640525	−17.3	−15.2
360	2034572	640540	−17.3	−15.2
365	2034578	640556	−17.3	−15.3
370	2034583	640571	−17.6	−15.6
375	2034589	640587	−18.1	−16.1
380	2034595	640602	−18.5	−16.5
385	2034601	640617	−17.8	−15.7
390	2034607	640633	−17.3	−15.3
395	2034613	640648	−17.9	−15.9
400	2034619	640664	−18.4	−16.4
405	2034624	640679	−18.6	−16.6
410	2034630	640694	−18.8	−16.7
415	2034636	640709	−19.6	−17.6
420	2034642	640724	−19.8	−17.7
425	2034648	640740	−18.8	−16.7
430	2034653	640755	−18.3	−16.2
435	2034659	640770	−19.1	−17.1
440	2034665	640786	−19.8	−17.7
445	2034671	640801	−20.0	−18.0
450	2034677	640817	−19.1	−17.1
455	2034682	640832	−18.5	−16.5
460	2034688	640847	−18.4	−16.4
465	2034694	640863	−17.9	−15.9
470	2034700	640878	−18.6	−16.6
475	2034706	640894	−19.6	−17.6
480	2034712	640909	−19.8	−17.7
485	2034717	640924	−19.5	−17.5
490	2034723	640939	−19.3	−17.2
495	2034729	640954	−19.3	−17.3
500	2034735	640970	−20.0	−18.0
505	2034741	640985	−20.8	−18.7
510	2034746	641000	−21.0	−19.0
515	2034752	641016	−21.8	−19.7
520	2034758	641031	−22.3	−20.3
525	2034764	641047	−22.4	−20.4
530	2034770	641062	−22.6	−20.6
535	2034775	641077	−22.8	−20.7
540	2034781	641093	−22.6	−20.6
545	2034787	641108	−22.5	−20.5
550	2034793	641124	−22.5	−20.5

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N6017

June 17, 1993
Start/End Time: 1003/1013 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2000.138
Low Water Datum [LWD] Correction feet −2.83

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2033959.348	639490.253	8.459	10.519
	2033966.192	639506.957	8.175	10.235
	2033968.503	639513.231	8.066	10.126
	2033968.743	639514.081	9.385	11.445
	2033970.103	639516.740	9.224	11.284
	2033974.427	639527.193	7.685	9.745
	2033976.013	639532.362	7.823	9.883
	2033979.159	639537.719	2.182	4.242
	2033979.692	639538.529	0.302	2.362
	2033980.878	639541.180	−1.291	0.769
Fathometer Data				
15	2033983	639553	−5.2	−3.2
20	2033989	639569	−7.5	−5.5
25	2033995	639584	−7.8	−5.8
30	2034001	639600	−7.9	−5.9
35	2034007	639614	−8.1	−6.1
40	2034012	639629	−8.3	−6.3
45	2034018	639645	−8.6	−6.6
50	2034024	639660	−8.9	−6.9
55	2034030	639676	−9.2	−7.2
60	2034036	639691	−9.6	−7.6
65	2034041	639706	−10.1	−8.1
70	2034047	639722	−10.7	−8.7
75	2034053	639737	−11.4	−9.4
80	2034059	639753	−11.7	−9.7
85	2034065	639768	−11.8	−9.8
90	2034070	639783	−12.3	−10.3
95	2034076	639799	−12.6	−10.6
100	2034082	639814	−12.4	−10.4
105	2034088	639830	−12.3	−10.3
110	2034094	639844	−12.7	−10.7
115	2034100	639859	−13.2	−11.2
120	2034106	639875	−13.3	−11.3
125	2034111	639890	−13.2	−11.2
130	2034117	639906	−13.1	−11.1
135	2034123	639921	−13.2	−11.2
140	2034129	639936	−13.2	−11.2
145	2034135	639952	−13.0	−11.0
150	2034140	639967	−12.7	−10.7
155	2034146	639983	−12.6	−10.6
160	2034152	639998	−12.6	−10.6
165	2034158	640013	−12.8	−10.8
170	2034164	640029	−13.1	−11.1
175	2034169	640044	−13.6	−11.6
180	2034175	640060	−14.0	−12.0
185	2034181	640074	−14.2	−12.2
190	2034187	640089	−14.4	−12.4
195	2034193	640105	−14.6	−12.6
200	2034199	640120	−14.7	−12.7
205	2034205	640136	−14.8	−12.8
210	2034210	640151	−14.5	−12.5
215	2034216	640167	−14.3	−12.3
220	2034222	640182	−14.2	−12.2
225	2034228	640197	−14.5	−12.5
230	2034234	640213	−15.2	−13.2
235	2034239	640228	−15.6	−13.6
240	2034245	640244	−15.1	−13.1
245	2034251	640259	−15.3	−13.3
250	2034257	640274	−16.3	−14.3
255	2034263	640290	−16.7	−14.7
260	2034268	640304	−15.7	−13.7
265	2034274	640320	−15.6	−13.6
270	2034280	640335	−16.0	−14.0
275	2034286	640350	−16.7	−14.7
280	2034292	640366	−16.9	−14.9
285	2034298	640381	−17.0	−15.0
290	2034304	640397	−17.1	−15.1
295	2034309	640412	−17.2	−15.2
300	2034315	640427	−17.6	−15.6
305	2034321	640443	−17.9	−15.9
310	2034327	640458	−17.8	−15.8
315	2034333	640474	−17.8	−15.8
320	2034338	640489	−18.2	−16.2
325	2034344	640504	−18.2	−16.2
330	2034350	640520	−16.7	−14.7
335	2034356	640534	−17.1	−15.1
340	2034362	640550	−18.0	−16.0
345	2034367	640565	−18.5	−16.5
350	2034373	640580	−18.3	−16.3
355	2034379	640596	−17.2	−15.2
360	2034385	640611	−16.5	−14.5
365	2034391	640627	−17.8	−15.8
370	2034396	640642	−18.1	−16.1
375	2034402	640657	−19.1	−17.1
380	2034408	640673	−18.1	−16.1
385	2034414	640688	−18.9	−16.9
390	2034420	640704	−17.7	−15.7
395	2034426	640719	−18.5	−16.5
400	2034431	640734	−19.2	−17.2
405	2034437	640750	−19.7	−17.7
410	2034443	640764	−20.0	−18.0
415	2034449	640780	−19.5	−17.5
420	2034455	640795	−19.4	−17.4
425	2034460	640810	−19.3	−17.3
430	2034466	640826	−19.5	−17.5
435	2034472	640841	−19.3	−17.3
440	2034478	640857	−19.4	−17.4
445	2034484	640872	−19.9	−17.9
450	2034490	640888	−19.7	−17.7
455	2034495	640903	−20.3	−18.3
460	2034501	640918	−20.1	−18.1
465	2034507	640934	−20.2	−18.2
470	2034513	640949	−19.7	−17.7
475	2034519	640965	−19.9	−17.9
480	2034525	640980	−19.1	−17.1
485	2034530	640994	−19.7	−17.7
490	2034536	641010	−20.3	−18.3
495	2034542	641025	−20.5	−18.5
500	2034548	641041	−20.1	−18.1
505	2034554	641056	−19.5	−17.5
510	2034559	641071	−20.0	−18.0
515	2034565	641087	−19.9	−17.9
520	2034571	641102	−19.8	−17.8
525	2034577	641118	−20.4	−18.4
530	2034583	641133	−21.3	−19.3
535	2034588	641148	−21.9	−19.9
540	2034594	641164	−22.2	−20.2
545	2034600	641179	−22.4	−20.4
550	2034606	641195	−21.7	−19.7

1993 FOREST PARKBEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N5817

June 17, 1993
Start/End Time: 0844/0853 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2019.256
Low Water Datum [LWD] Correction feet −2.96

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2033780.763	639582.964	8.199	10.259
	2033784.055	639590.969	7.994	10.054
	2033784.350	639591.832	9.368	11.428
	2033785.798	639595.850	8.630	10.690
	2033788.339	639603.265	9.149	11.209
	2033790.237	639610.258	6.914	8.974
	2033792.619	639617.220	1.183	3.243
	2033795.089	639620.448	−3.064	−1.004
	2033795.962	639626.308	−2.760	−0.700
Fathometer Data				
10	2033797	639627	−2.6	−0.5
15	2033803	639641	−4.9	−2.8
20	2033809	639657	−7.2	−5.1
25	2033815	639672	−8.1	−6.0
30	2033821	639688	−8.9	−6.8
35	2033826	639703	−9.6	−7.5
40	2033832	639718	−10.2	−8.1
45	2033838	639734	−10.5	−8.4
50	2033844	639749	−10.7	−8.6
55	2033850	639765	−10.8	−8.7
60	2033855	639780	−11.1	−9.0
65	2033861	639796	−11.4	−9.3
70	2033867	639811	−11.6	−9.5
75	2033873	639826	−11.8	−9.7
80	2033879	639842	−12.0	−9.9
85	2033885	639857	−12.2	−10.1
90	2033891	639872	−12.4	−10.3
95	2033896	639887	−12.6	−10.5
100	2033902	639902	−12.7	−10.6
105	2033908	639918	−12.9	−10.8
110	2033914	639933	−13.0	−10.9
115	2033920	639949	−13.2	−11.1
120	2033925	639964	−13.2	−11.1
125	2033931	639979	−13.4	−11.3
130	2033937	639995	−13.6	−11.5
135	2033943	640010	−13.6	−11.5
140	2033949	640026	−13.5	−11.4
145	2033954	640041	−12.8	−10.7
150	2033960	640056	−12.8	−10.7
155	2033966	640072	−13.1	−11.0
160	2033972	640087	−13.6	−11.5
165	2033978	640102	−14.0	−11.9
170	2033984	640117	−13.9	−11.8
175	2033989	640132	−14.1	−12.0
180	2033995	640148	−14.3	−12.2
185	2034001	640163	−14.5	−12.4
190	2034007	640179	−14.5	−12.4
195	2034013	640194	−14.5	−12.4
200	2034018	640209	−14.6	−12.5
205	2034024	640225	−14.6	−12.5
210	2034030	640240	−14.6	−12.5
215	2034036	640256	−14.6	−12.5
220	2034042	640271	−14.7	−12.6
225	2034047	640286	−14.6	−12.5
230	2034053	640302	−15.2	−13.1
235	2034059	640317	−15.5	−13.4
240	2034065	640332	−15.7	−13.6
245	2034071	640347	−15.8	−13.7
250	2034076	640362	−15.4	−13.3
255	2034082	640378	−14.9	−12.8
260	2034088	640393	−15.6	−13.5
265	2034094	640409	−16.3	−14.2
270	2034100	640424	−17.1	−15.0
275	2034106	640439	−17.3	−15.2
280	2034112	640455	−17.3	−15.2
285	2034117	640470	−17.1	−15.0
290	2034123	640486	−17.9	−15.8
295	2034129	640501	−17.9	−15.8
300	2034135	640517	−17.1	−15.0
305	2034141	640532	−16.6	−14.5
310	2034146	640547	−16.8	−14.7
315	2034152	640562	−17.5	−15.4
320	2034158	640577	−17.8	−15.7
325	2034164	640593	−17.8	−15.7
330	2034170	640608	−17.9	−15.8
335	2034175	640623	−18.2	−16.1
340	2034181	640639	−18.4	−16.3
345	2034187	640654	−18.5	−16.4
350	2034193	640670	−18.8	−16.7
355	2034199	640685	−19.0	−16.9
360	2034205	640700	−18.8	−16.7
365	2034211	640716	−18.5	−16.4
370	2034216	640731	−18.2	−16.1
375	2034222	640747	−18.0	−15.9
380	2034228	640762	−18.2	−16.1
385	2034234	640777	−18.7	−16.6
390	2034240	640792	−19.0	−16.9
395	2034245	640807	−18.8	−16.7
400	2034251	640823	−18.5	−16.4
405	2034257	640838	−18.6	−16.5
410	2034263	640853	−18.9	−16.8
415	2034269	640869	−19.0	−16.9
420	2034274	640884	−19.0	−16.9
425	2034280	640900	−19.2	−17.1
430	2034286	640915	−19.3	−17.2
435	2034292	640930	−19.7	−17.6
440	2034298	640946	−19.7	−17.6
445	2034303	640961	−20.1	−18.0
450	2034310	640977	−20.0	−17.9
455	2034315	640992	−19.4	−17.3
460	2034321	641007	−19.3	−17.2
465	2034327	641022	−19.6	−17.5
470	2034333	641037	−19.9	−17.8
475	2034339	641053	−19.6	−17.5
480	2034344	641068	−19.2	−17.1
485	2034350	641083	−19.9	−17.8
490	2034356	641099	−20.6	−18.5
495	2034362	641114	−20.8	−18.7
500	2034368	641130	−19.8	−17.7
505	2034373	641145	−19.8	−17.7
510	2034379	641160	−20.9	−18.8
515	2034385	641176	−21.2	−19.1
520	2034391	641191	−21.3	−19.2
525	2034397	641207	−21.2	−19.1
530	2034402	641222	−21.1	−19.0
535	2034408	641237	−21.1	−19.0
540	2034414	641252	−21.7	−19.6
545	2034420	641267	−21.8	−19.7
550	2034426	641283	−22.0	−19.9
555	2034432	641298	−21.9	−19.8
560	2034438	641314	−20.6	−18.5
565	2034443	641329	−20.5	−18.4
570	2034449	641344	−21.0	−18.9
575	2034455	641360	−21.6	−19.5
580	2034461	641375	−21.8	−19.7
585	2034467	641391	−21.8	−19.7
590	2034472	641406	−22.0	−19.9
595	2034478	641421	−22.6	−20.5

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N5617

June 17, 1993
Start/End Time: 0825/0834 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2022.435
Low Water Datum [LWD] Correction feet −2.86

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2033596.177	639661.071	8.139	10.199
	2033599.730	639668.510	8.050	10.110
	2033599.927	639669.384	9.328	11.388
	2033600.282	639669.639	7.345	9.405
	2033602.131	639673.516	8.930	10.990
	2033605.350	639682.207	7.698	9.758
	2033607.456	639689.922	3.950	6.010
	2033608.614	639691.987	−0.254	1.806
	2033611.961	639696.553	−1.131	0.929
	2033613.323	639700.760	−4.975	−2.915
Fathometer Data				
15	2033617	639716	−7.6	−5.5
20	2033623	639731	−8.5	−6.4
25	2033629	639746	−9.0	−6.9
30	2033635	639762	−9.1	−7.0
35	2033640	639777	−9.3	−7.2
40	2033646	639793	−9.6	−7.5
45	2033652	639808	−10.0	−7.9
50	2033658	639823	−10.3	−8.2
55	2033664	639839	−10.8	−8.7
60	2033670	639854	−10.9	−8.8
65	2033676	639870	−11.3	−9.2
70	2033681	639884	−11.6	−9.5
75	2033687	639899	−11.7	−9.6
80	2033693	639915	−11.8	−9.7
85	2033699	639930	−12.1	−10.0
90	2033705	639946	−12.2	−10.1
95	2033710	639961	−11.8	−9.7
100	2033716	639977	−12.2	−10.1
105	2033722	639992	−12.6	−10.5
110	2033728	640007	−12.9	−10.8
115	2033734	640023	−12.8	−10.7
120	2033739	640038	−12.7	−10.6
125	2033745	640054	−12.7	−10.6
130	2033751	640069	−12.8	−10.7
135	2033757	640084	−12.9	−10.8
140	2033763	640100	−13.0	−10.9
145	2033768	640114	−13.1	−11.0
150	2033775	640130	−13.5	−11.4
155	2033780	640145	−13.5	−11.4
160	2033786	640160	−13.5	−11.4
165	2033792	640176	−13.4	−11.3
170	2033798	640191	−13.7	−11.6
175	2033804	640207	−13.9	−11.8
180	2033809	640222	−14.1	−12.0
185	2033815	640237	−14.1	−12.0
190	2033821	640253	−14.1	−12.0
195	2033827	640268	−13.9	−11.8
200	2033833	640284	−14.4	−12.3
205	2033838	640299	−14.6	−12.5
210	2033844	640314	−14.6	−12.5
215	2033850	640330	−14.8	−12.7
220	2033856	640344	−14.8	−12.7
225	2033862	640360	−14.7	−12.6
230	2033867	640375	−14.5	−12.4
235	2033873	640390	−14.4	−12.3
240	2033879	640406	−14.7	−12.6
245	2033885	640421	−15.9	−13.8
250	2033891	640437	−16.1	−14.0
255	2033897	640452	−16.8	−14.7
260	2033902	640467	−16.8	−14.7
265	2033908	640483	−17.0	−14.9
270	2033914	640498	−16.8	−14.7
275	2033920	640514	−16.9	−14.8
280	2033926	640529	−17.5	−15.4
285	2033931	640544	−17.2	−15.1
290	2033937	640560	−17.5	−15.4
295	2033943	640574	−18.1	−16.0
300	2033949	640590	−17.9	−15.8
305	2033955	640605	−17.6	−15.5
310	2033960	640620	−17.5	−15.4
315	2033966	640636	−17.7	−15.6
320	2033972	640651	−18.1	−16.0
325	2033978	640667	−18.8	−16.7
330	2033984	640682	−18.7	−16.6
335	2033990	640698	−19.0	−16.9
340	2033996	640713	−18.9	−16.8
345	2034001	640728	−18.9	−16.8
350	2034007	640744	−19.0	−16.9
355	2034013	640759	−19.1	−17.0
360	2034019	640775	−18.9	−16.8
365	2034025	640790	−19.1	−17.0
370	2034030	640804	−19.6	−17.5
375	2034036	640820	−19.8	−17.7
380	2034042	640835	−19.6	−17.5
385	2034048	640851	−17.9	−15.8
390	2034054	640866	−19.2	−17.1
395	2034059	640881	−19.6	−17.5
400	2034065	640897	−19.8	−17.7
405	2034071	640912	−20.0	−17.9
410	2034077	640928	−20.1	−18.0
415	2034083	640943	−19.9	−17.8
420	2034088	640958	−19.4	−17.3
425	2034095	640974	−18.9	−16.8
430	2034100	640989	−18.5	−16.4
435	2034106	641005	−19.0	−16.9
440	2034112	641020	−19.8	−17.7
445	2034118	641034	−19.9	−17.8
450	2034124	641050	−19.8	−17.7
455	2034129	641065	−19.7	−17.6
460	2034135	641081	−19.6	−17.5
465	2034141	641096	−20.1	−18.0
470	2034147	641111	−19.6	−17.5
475	2034153	641127	−19.2	−17.1
480	2034158	641142	−19.3	−17.2
485	2034164	641158	−19.7	−17.6
490	2034170	641173	−19.0	−16.9
495	2034176	641188	−19.4	−17.3
500	2034182	641204	−20.0	−17.9
505	2034187	641219	−20.4	−18.3
510	2034193	641235	−20.7	−18.6
515	2034199	641250	−21.0	−18.9
520	2034205	641264	−21.7	−19.6
525	2034211	641280	−21.1	−19.0
530	2034217	641295	−20.8	−18.7
535	2034223	641311	−21.9	−19.8
540	2034228	641326	−22.3	−20.2
545	2034234	641341	−22.0	−19.9
550	2034240	641357	−21.1	−19.0

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N5417

June 17, 1993
Start/End Time: 0805/0814 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1819.283
Low Water Datum [LWD] Correction feet −2.75

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2033335.172	639537.519	9.502	11.563
	2033338.905	639545.462	8.831	10.891
	2033340.806	639550.806	9.121	11.181
	2033344.431	639560.690	8.965	11.025
	2033345.457	639564.188	7.191	9.251
	2033347.167	639567.261	5.667	7.727
	2033347.990	639568.861	3.858	5.918
	2033349.444	639573.322	2.779	4.839
	2033350.432	639578.135	1.939	3.999
	2033352.083	639584.246	0.842	2.902
	2033352.891	639588.304	0.426	2.486
	2033356.026	639594.088	−0.090	1.970
	2033359.637	639603.747	−1.174	0.886
	2033364.111	639618.590	−1.690	0.370
	2033370.185	639632.655	−2.615	−0.555
	2033373.719	639646.073	−3.844	−1.784
Fathometer Data				
35	2033381	639658	−4.3	−2.3
40	2033387	639674	−4.8	−2.8
45	2033393	639689	−5.4	−3.4
50	2033399	639704	−6.2	−4.2
55	2033405	639720	−6.9	−4.9
60	2033411	639735	−7.5	−5.5
65	2033417	639751	−8.0	−6.0
70	2033422	639766	−8.4	−6.4
75	2033428	639781	−8.7	−6.7
80	2033434	639796	−8.9	−6.9
85	2033440	639811	−9.2	−7.2
90	2033446	639827	−9.5	−7.5
95	2033451	639842	−9.9	−7.9
100	2033457	639857	−10.5	−8.5
105	2033463	639873	−10.9	−8.9
110	2033469	639888	−11.1	−9.1
115	2033475	639904	−11.2	−9.2
120	2033480	639919	−11.4	−9.4
125	2033486	639934	−11.8	−9.8
130	2033492	639950	−12.1	−10.1
135	2033498	639965	−12.3	−10.3
140	2033504	639981	−12.4	−10.4
145	2033509	639996	−12.3	−10.3
150	2033515	640011	−12.2	−10.2
155	2033521	640026	−12.3	−10.3
160	2033527	640041	−12.5	−10.5
165	2033533	640057	−12.2	−10.2
170	2033539	640072	−12.8	−10.8
175	2033544	640087	−12.8	−10.8
180	2033550	640103	−12.8	−10.8
185	2033556	640118	−13.1	−11.1
190	2033562	640134	−13.2	−11.2
195	2033568	640149	−13.4	−11.4
200	2033573	640164	−13.4	−11.4
205	2033579	640180	−13.4	−11.4
210	2033585	640195	−14.0	−12.0
215	2033591	640211	−14.0	−12.0
220	2033597	640226	−13.8	−11.8
225	2033602	640241	−13.7	−11.7
230	2033608	640256	−13.9	−11.9
235	2033614	640271	−14.3	−12.3
240	2033620	640287	−14.8	−12.8
245	2033626	640302	−15.0	−13.0
250	2033632	640317	−14.7	−12.7
255	2033638	640333	−14.1	−12.1
260	2033643	640348	−14.8	−12.8
265	2033649	640364	−15.0	−13.0
270	2033655	640379	−15.1	−13.1
275	2033661	640395	−15.3	−13.3
280	2033667	640410	−15.5	−13.5
285	2033672	640425	−15.6	−13.6
290	2033678	640441	−15.7	−13.7
295	2033684	640456	−15.8	−13.8
300	2033690	640472	−15.9	−13.9
305	2033696	640486	−16.0	−14.0
310	2033701	640501	−16.2	−14.2
315	2033707	640517	−16.4	−14.4
320	2033713	640532	−17.0	−15.0
325	2033719	640548	−17.4	−15.4
330	2033725	640563	−17.9	−15.9
335	2033730	640578	−17.3	−15.3
340	2033737	640594	−17.2	−15.2
345	2033742	640609	−17.7	−15.7
350	2033748	640625	−18.2	−16.2
355	2033754	640640	−17.9	−15.9
360	2033760	640655	−17.9	−15.9
365	2033766	640671	−17.9	−15.9
370	2033771	640686	−17.3	−15.3
375	2033777	640702	−17.2	−15.2
380	2033783	640716	−18.5	−16.5
385	2033789	640731	−19.3	−17.3
390	2033795	640747	−19.8	−17.8
395	2033800	640762	−20.0	−18.0
400	2033806	640778	−20.2	−18.2
405	2033812	640793	−20.4	−18.4
410	2033818	640808	−20.7	−18.7
415	2033824	640824	−20.5	−18.5
420	2033829	640839	−20.4	−18.4
425	2033835	640855	−20.4	−18.4
430	2033841	640870	−20.3	−18.3
435	2033847	640885	−20.1	−18.1
440	2033853	640901	−19.9	−17.9
445	2033859	640916	−20.3	−18.3
450	2033865	640932	−20.3	−18.3
455	2033870	640946	−20.1	−18.1
460	2033876	640961	−20.4	−18.4
465	2033882	640977	−21.1	−19.1
470	2033888	640992	−20.8	−18.8
475	2033894	641008	−20.7	−18.7
480	2033899	641023	−20.3	−18.3
485	2033905	641038	−20.7	−18.7
490	2033911	641054	−20.3	−18.3
495	2033917	641069	−20.0	−18.0
500	2033923	641085	−20.2	−18.2
505	2033928	641100	−20.4	−18.4
510	2033934	641116	−20.1	−18.1
515	2033940	641131	−19.8	−17.8
520	2033946	641146	−20.3	−18.3
525	2033952	641162	−20.6	−18.6
530	2033958	641176	−20.4	−18.4
535	2033964	641192	−20.4	−18.4
540	2033969	641207	−20.3	−18.3
545	2033975	641222	−20.2	−18.2
550	2033981	641238	−20.4	−18.4
555	2033987	641253	−20.7	−18.7
560	2033993	641269	−21.6	−19.6
565	2033998	641284	−22.0	−20.0

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N5267

June 17, 1993
Start/End Time: 0730/0740 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1792.469
Low Water Datum [LWD] Correction feet −2.73

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2033186.160	639563.847	9.899	11.959
	2033188.481	639570.016	9.678	11.738
	2033191.061	639578.943	8.680	10.740
	2033193.574	639585.972	7.648	9.708
	2033193.932	639586.474	2.877	4.938
	2033195.636	639591.281	2.425	4.485
	2033197.074	639594.439	−0.952	1.108
	2033199.726	639602.691	−1.953	0.107
	2033201.192	639611.297	−3.175	−1.115
	2033202.737	639620.304	−4.091	−2.031
Fathometer Data				
15	2033209	639625	−4.4	−2.4
20	2033214	639640	−5.1	−3.1
25	2033220	639655	−5.7	−3.7
30	2033226	639671	−6.0	−4.0
35	2033232	639686	−6.1	−4.1
40	2033238	639702	−6.2	−4.2
45	2033243	639717	−6.2	−4.2
50	2033249	639733	−6.2	−4.2
55	2033255	639748	−6.4	−4.4
60	2033261	639763	−7.0	−5.0
65	2033267	639779	−7.4	−5.4
70	2033272	639794	−8.1	−6.1
75	2033278	639809	−8.4	−6.4
80	2033284	639824	−8.9	−6.9
85	2033290	639839	−9.2	−7.2
90	2033296	639855	−9.4	−7.4
95	2033301	639870	−9.4	−7.4
100	2033308	639886	−9.5	−7.5
105	2033313	639901	−9.5	−7.5
110	2033319	639916	−9.6	−7.6
115	2033325	639932	−9.7	−7.7
120	2033331	639947	−10.1	−8.1
125	2033337	639963	−10.7	−8.7
130	2033342	639978	−11.5	−9.5
135	2033348	639993	−12.1	−10.1
140	2033354	640009	−12.4	−10.4
145	2033360	640024	−12.6	−10.6
150	2033366	640039	−12.7	−10.7
155	2033371	640054	−12.8	−10.8
160	2033377	640069	−12.8	−10.8
165	2033383	640085	−12.9	−10.9
170	2033389	640100	−13.0	−11.0
175	2033395	640116	−12.9	−10.9
180	2033400	640131	−12.8	−10.8
185	2033406	640146	−13.1	−11.1
190	2033412	640162	−13.3	−11.3
195	2033418	640177	−13.4	−11.4
200	2033424	640193	−13.6	−11.6
205	2033430	640208	−13.8	−11.8
210	2033435	640223	−13.8	−11.8
215	2033441	640239	−13.8	−11.8
220	2033447	640254	−13.8	−11.8
225	2033453	640269	−14.0	−12.0
230	2033459	640284	−14.2	−12.2
235	2033464	640299	−14.3	−12.3
240	2033470	640315	−14.5	−12.5
245	2033476	640330	−14.6	−12.6
250	2033482	640346	−14.6	−12.6
255	2033488	640361	−14.7	−12.7
260	2033493	640376	−15.3	−13.3
265	2033499	640392	−15.6	−13.6
270	2033505	640407	−15.9	−13.9
275	2033511	640423	−16.0	−14.0
280	2033517	640438	−16.0	−14.0
285	2033523	640454	−16.1	−14.1
290	2033529	640469	−16.3	−14.3
295	2033534	640484	−16.6	−14.6
300	2033540	640499	−16.7	−14.7
305	2033546	640514	−16.3	−14.3
310	2033552	640530	−16.1	−14.1
315	2033558	640545	−16.0	−14.0
320	2033563	640560	−15.8	−13.8
325	2033569	640576	−15.7	−13.7
330	2033575	640591	−16.7	−14.7
335	2033581	640607	−17.4	−15.4
340	2033587	640622	−17.8	−15.8
345	2033592	640637	−18.1	−16.1
350	2033598	640653	−18.2	−16.2
355	2033604	640668	−18.5	−16.5
360	2033610	640684	−18.9	−16.9
365	2033616	640699	−19.3	−17.3
370	2033621	640714	−19.4	−17.4
375	2033627	640729	−18.3	−16.3
380	2033633	640744	−17.7	−15.7
385	2033639	640760	−17.7	−15.7
390	2033645	640775	−18.7	−16.7
395	2033651	640790	−18.6	−16.6
400	2033657	640806	−19.2	−17.2
405	2033662	640821	−19.8	−17.8
410	2033668	640837	−20.4	−18.4
415	2033674	640852	−21.0	−19.0
420	2033680	640867	−20.8	−18.8
425	2033686	640883	−20.4	−18.4
430	2033691	640898	−18.7	−16.7
435	2033697	640914	−18.9	−16.9
440	2033703	640929	−19.9	−17.9
445	2033709	640944	−20.2	−18.2
450	2033715	640959	−20.1	−18.1
455	2033720	640974	−19.8	−17.8
460	2033726	640990	−20.4	−18.4
465	2033732	641005	−20.8	−18.8
470	2033738	641020	−20.5	−18.5
475	2033744	641036	−20.4	−18.4
480	2033750	641051	−20.7	−18.7
485	2033756	641067	−21.0	−19.0
490	2033761	641082	−20.7	−18.7
495	2033767	641097	−20.9	−18.9
500	2033773	641113	−20.0	−18.0
505	2033779	641128	−19.4	−17.4
510	2033785	641144	−20.5	−18.5
515	2033790	641159	−20.5	−18.5
520	2033796	641175	−20.1	−18.1
525	2033802	641189	−21.0	−19.0
530	2033808	641204	−21.4	−19.4
535	2033814	641220	−21.3	−19.3
540	2033819	641235	−21.4	−19.4
545	2033825	641251	−21.7	−19.7
550	2033831	641266	−22.0	−20.0

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N5067

June 17, 1993
Start/End Time: 0705/0720 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1772.616
Low Water Datum [LWD] Correction feet −2.71

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2032988.829	639614.269	10.059	12.119
	2032992.608	639621.653	9.694	11.754
	2032997.453	639631.168	8.440	10.500
	2033000.514	639640.012	8.087	10.147
	2033002.198	639644.312	3.542	5.602
	2033004.560	639651.965	2.735	4.795
	2033007.048	639659.369	3.250	5.310
	2033012.035	639672.423	2.465	4.525
	2033013.811	639675.974	1.183	3.243
	2033016.481	639687.090	−0.393	1.667
	2033019.478	639696.242	−2.174	−0.114
	2033023.371	639708.075	−4.128	−2.068
	2033029.500	639721.495	−6.651	−4.591
	2033034.934	639733.851	−7.031	−4.971
	2033042.830	639748.248	−8.907	−6.847
Fathometer Data				
40	2033044	639754	−8.8	−6.7
45	2033049	639769	−8.3	−6.3
50	2033055	639785	−8.1	−6.1
55	2033061	639800	−8.3	−6.2
60	2033067	639815	−8.4	−6.4
65	2033073	639831	−8.6	−6.6
70	2033078	639846	−9.1	−7.1
75	2033084	639862	−9.3	−7.3
80	2033090	639877	−9.3	−7.3
85	2033096	639892	−9.0	−7.0
90	2033102	639908	−8.8	−6.8
95	2033107	639922	−8.8	−6.7
100	2033113	639938	−8.8	−6.8
105	2033119	639953	−8.8	−6.8
110	2033125	639969	−8.9	−6.9
115	2033131	639984	−9.0	−7.0
120	2033136	639999	−9.3	−7.2
125	2033143	640015	−9.5	−7.5
130	2033148	640030	−9.8	−7.7
135	2033154	640046	−9.9	−7.9
140	2033160	640061	−10.3	−8.2
145	2033166	640076	−10.4	−8.4
150	2033172	640092	−10.8	−8.7
155	2033177	640107	−11.0	−9.0
160	2033183	640123	−12.0	−10.0
165	2033189	640138	−12.8	−10.7
170	2033195	640152	−12.3	−10.3
175	2033201	640168	−12.5	−10.5
180	2033206	640183	−12.8	−10.7
185	2033212	640199	−12.8	−10.8
190	2033218	640214	−12.9	−10.9
195	2033224	640229	−13.0	−11.0
200	2033230	640245	−12.9	−10.9
205	2033235	640260	−12.9	−10.9
210	2033241	640276	−12.9	−10.9
215	2033247	640291	−13.0	−11.0
220	2033253	640306	−13.3	−11.2
225	2033259	640322	−13.8	−11.7
230	2033265	640337	−14.0	−12.0
235	2033271	640353	−14.1	−12.1
240	2033276	640368	−14.0	−12.0
245	2033282	640382	−14.0	−12.0
250	2033288	640398	−14.6	−12.6
255	2033294	640413	−14.5	−12.5
260	2033300	640429	−14.5	−12.5
265	2033305	640444	−14.4	−12.4
270	2033311	640459	−14.4	−12.4
275	2033317	640475	−14.8	−12.8
280	2033323	640490	−15.0	−13.0
285	2033329	640506	−15.1	−13.1
290	2033334	640521	−15.3	−13.2
295	2033340	640536	−15.3	−13.3
300	2033346	640552	−15.3	−13.3
305	2033352	640567	−15.4	−13.4
310	2033358	640583	−15.5	−13.5
315	2033364	640598	−16.3	−14.2
320	2033369	640612	−17.0	−15.0
325	2033375	640628	−17.1	−15.1
330	2033381	640643	−17.0	−15.0
335	2033387	640659	−16.8	−14.8
340	2033393	640674	−16.8	−14.8
345	2033399	640690	−16.6	−14.6
350	2033404	640705	−17.3	−15.3
355	2033410	640720	−17.8	−15.7
360	2033416	640736	−18.2	−16.2
365	2033422	640751	−18.4	−16.4
370	2033428	640767	−18.6	−16.6
375	2033433	640782	−18.7	−16.7
380	2033439	640797	−18.7	−16.7
385	2033445	640813	−18.8	−16.8
390	2033451	640828	−18.9	−16.9
395	2033457	640843	−19.1	−17.1
400	2033462	640858	−19.2	−17.2
405	2033468	640873	−19.3	−17.3
410	2033474	640889	−19.3	−17.3
415	2033480	640904	−19.6	−17.6
420	2033486	640920	−20.1	−18.1
425	2033492	640935	−20.1	−18.1
430	2033497	640950	−20.2	−18.2
435	2033503	640966	−20.2	−18.2
440	2033509	640981	−20.1	−18.1
445	2033515	640997	−19.8	−17.8
450	2033521	641012	−19.0	−17.0
455	2033526	641027	−18.9	−16.9
460	2033532	641043	−19.0	−17.0
465	2033538	641058	−19.1	−17.1
470	2033544	641073	−19.5	−17.5
475	2033550	641088	−19.7	−17.7
480	2033555	641103	−19.2	−17.2
485	2033561	641119	−19.4	−17.4
490	2033567	641134	−19.1	−17.1
495	2033573	641150	−19.0	−17.0
500	2033579	641165	−19.5	−17.5
505	2033585	641180	−19.9	−17.9
510	2033591	641196	−20.0	−18.0
515	2033596	641211	−20.1	−18.1
520	2033602	641227	−20.4	−18.4
525	2033608	641242	−20.8	−18.8
530	2033614	641257	−20.9	−18.9
535	2033620	641273	−20.7	−18.7
540	2033625	641288	−21.6	−19.6
545	2033631	641303	−21.7	−19.7
550	2033637	641318	−21.6	−19.6
555	2033643	641333	−21.6	−19.6
560	2033649	641349	−21.7	−19.7
565	2033654	641364	−21.3	−19.3
570	2033660	641380	−21.3	−19.3
575	2033666	641395	−21.2	−19.2
580	2033672	641411	−20.6	−18.6
585	2033678	641426	−20.2	−18.2
590	2033684	641441	−20.2	−18.2
595	2033690	641457	−20.7	−18.7
600	2033695	641472	−21.4	−19.4
605	2033701	641488	−22.1	−20.1

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N4867

June 17, 1993
Start/End Time: 0646/0655 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1734.852
Low Water Datum [LWD] Correction feet −2.70

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2032796.804	639666.908	8.625	10.685
	2032799.028	639673.745	8.247	10.307
	2032801.136	639679.265	6.970	9.030
	2032802.168	639684.097	6.947	9.007
	2032804.414	639688.456	6.193	8.253
	2032804.573	639689.079	4.434	6.494
	2032808.092	639699.024	3.251	5.311
	2032811.419	639708.281	2.379	4.439
	2032814.846	639718.264	1.400	3.460
	2032818.051	639728.545	0.200	2.260
	2032821.182	639739.648	−1.937	0.123
	2032822.333	639753.714	−3.256	−1.196
	2032824.986	639764.835	−4.191	−2.131
Fathometer Data				
35	2032837	639775	−6.2	−4.1
40	2032843	639790	−7.4	−5.3
45	2032849	639805	−7.8	−5.7
50	2032855	639820	−8.3	−6.2
55	2032860	639835	−8.6	−6.5
60	2032866	639851	−8.8	−6.7
65	2032872	639866	−9.0	−6.9
70	2032878	639882	−9.1	−7.0
75	2032884	639897	−9.3	−7.2
80	2032890	639912	−9.6	−7.5
85	2032896	639928	−9.9	−7.8
90	2032901	639943	−10.0	−7.9
95	2032907	639959	−9.7	−7.6
100	2032913	639974	−9.5	−7.4
105	2032919	639989	−9.4	−7.3
110	2032925	640005	−9.3	−7.2
115	2032930	640020	−9.3	−7.2
120	2032936	640036	−9.3	−7.2
125	2032942	640050	−9.4	−7.3
130	2032948	640065	−9.6	−7.5
135	2032954	640081	−9.7	−7.6
140	2032959	640096	−9.8	−7.7
145	2032965	640112	−9.9	−7.8
150	2032971	640127	−10.1	−8.0
155	2032977	640142	−10.3	−8.2
160	2032983	640158	−10.6	−8.5
165	2032989	640173	−10.8	−8.7
170	2032995	640189	−11.6	−9.5
175	2033000	640204	−12.6	−10.5
180	2033006	640219	−13.2	−11.1
185	2033012	640235	−13.4	−11.3
190	2033018	640250	−13.7	−11.6
195	2033024	640266	−13.8	−11.7
200	2033029	640280	−13.8	−11.7
205	2033035	640295	−13.9	−11.8
210	2033041	640311	−14.0	−11.9
215	2033047	640326	−14.0	−11.9
220	2033053	640342	−14.1	−12.0
225	2033058	640357	−14.1	−12.0
230	2033064	640372	−14.0	−11.9
235	2033070	640388	−14.0	−11.9
240	2033076	640403	−14.2	−12.1
245	2033082	640419	−14.5	−12.4
250	2033087	640434	−14.6	−12.5
255	2033093	640449	−14.7	−12.6
260	2033099	640465	−14.8	−12.7
265	2033105	640480	−15.0	−12.9
270	2033111	640496	−14.9	−12.8
275	2033117	640510	−14.9	−12.8
280	2033122	640525	−14.9	−12.8
285	2033128	640541	−14.9	−12.8
290	2033134	640556	−15.0	−12.9
295	2033140	640572	−15.0	−12.9
300	2033146	640587	−15.0	−12.9
305	2033152	640603	−15.1	−13.0
310	2033157	640618	−15.2	−13.1
315	2033163	640633	−15.3	−13.2
320	2033169	640649	−15.5	−13.4
325	2033175	640664	−15.7	−13.6
330	2033181	640680	−16.1	−14.0
335	2033186	640695	−16.5	−14.4
340	2033192	640710	−17.1	−15.0
345	2033198	640726	−16.9	−14.8
350	2033204	640740	−16.7	−14.6
355	2033210	640756	−16.7	−14.6
360	2033216	640771	−17.1	−15.0
365	2033221	640786	−18.0	−15.9
370	2033227	640802	−17.9	−15.8
375	2033233	640817	−17.8	−15.7
380	2033239	640833	−18.3	−16.2
385	2033245	640848	−18.6	−16.5
390	2033250	640863	−18.8	−16.7
395	2033256	640879	−19.0	−16.9
400	2033262	640894	−19.3	−17.2
405	2033268	640910	−19.5	−17.4
410	2033274	640925	−19.7	−17.6
415	2033279	640940	−19.7	−17.6
420	2033285	640956	−19.1	−17.0
425	2033291	640970	−18.8	−16.7
430	2033297	640986	−18.9	−16.8
435	2033303	641001	−19.0	−16.9
440	2033308	641016	−19.2	−17.1
445	2033315	641032	−19.3	−17.2
450	2033320	641047	−19.7	−17.6
455	2033326	641063	−19.9	−17.8
460	2033332	641078	−19.9	−17.8
465	2033338	641093	−19.4	−17.3
470	2033344	641109	−19.2	−17.1
475	2033349	641124	−19.5	−17.4
480	2033355	641140	−19.7	−17.6
485	2033361	641155	−19.8	−17.7
490	2033367	641170	−20.2	−18.1
495	2033373	641186	−20.0	−17.9
500	2033378	641200	−19.5	−17.4
505	2033384	641216	−19.9	−17.8
510	2033390	641231	−20.6	−18.5
515	2033396	641246	−20.9	−18.8
520	2033402	641262	−21.2	−19.1
525	2033407	641277	−21.3	−19.2
530	2033414	641293	−21.3	−19.2
535	2033419	641308	−21.2	−19.1
540	2033425	641324	−21.1	−19.0
545	2033431	641339	−21.1	−19.0
550	2033437	641354	−21.0	−18.9
555	2033443	641370	−21.0	−18.9
560	2033448	641385	−20.9	−18.8
565	2033454	641401	−21.0	−18.9
570	2033460	641416	−21.1	−19.0
575	2033466	641430	−21.2	−19.1
580	2033472	641446	−21.6	−19.5
585	2033477	641461	−21.7	−19.6
590	2033483	641477	−21.9	−19.8
595	2033489	641492	−22.1	−20.0

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N4667

June 17, 1993
Start/End Time: ?/0620 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1844.994
Low Water Datum [LWD] Correction feet −2.84

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2032597.395	639703.195	7.175	9.235
	2032601.136	639715.287	6.683	8.743
	2032605.793	639728.870	5.929	7.989
	2032615.231	639754.027	4.521	6.581
	2032623.090	639775.074	3.675	5.735
	2032630.632	639796.656	2.520	4.580
	2032638.313	639815.635	1.868	3.928
	2032642.446	639823.657	2.388	4.448
	2032643.669	639830.453	8.006	10.066
	2032646.043	639836.474	7.417	9.477
	2032648.080	639841.140	6.478	8.539
	2032648.853	639844.462	5.521	7.581
	2032650.788	639849.422	0.876	2.936
	2032652.126	639853.668	−0.079	1.981
	2032653.754	639854.909	−2.938	−0.878
Fathometer Data				
6	2032656	639860	−2.0	0.0
10	2032660	639872	−6.1	−4.1
15	2032666	639887	−7.1	−5.1
20	2032672	639903	−8.0	−6.0
25	2032678	639918	−8.5	−6.5
30	2032683	639933	−8.8	−6.8
35	2032689	639948	−8.7	−6.7
40	2032695	639963	−9.1	−7.1
45	2032701	639979	−9.9	−7.9
50	2032707	639994	−10.2	−8.2
55	2032712	640009	−10.2	−8.2
60	2032719	640025	−10.1	−8.1
65	2032724	640040	−9.6	−7.6
70	2032730	640056	−9.1	−7.1
75	2032736	640071	−8.9	−6.9
80	2032742	640086	−8.8	−6.8
85	2032748	640102	−8.9	−6.9
90	2032753	640117	−9.0	−7.0
95	2032759	640133	−9.1	−7.1
100	2032765	640148	−9.1	−7.1
105	2032771	640163	−9.2	−7.2
110	2032777	640178	−9.3	−7.3
115	2032782	640193	−9.4	−7.4
120	2032788	640209	−9.6	−7.6
125	2032794	640224	−9.7	−7.7
130	2032800	640240	−9.9	−7.9
135	2032806	640255	−10.2	−8.2
140	2032811	640270	−10.5	−8.5
145	2032817	640286	−10.6	−8.6
150	2032823	640301	−10.8	−8.8
155	2032829	640317	−11.2	−9.2
160	2032835	640332	−11.9	−9.9
165	2032841	640347	−12.1	−10.1
170	2032847	640363	−12.4	−10.4
175	2032852	640378	−12.7	−10.7
180	2032858	640394	−13.0	−11.0
185	2032864	640408	−13.8	−11.8
190	2032870	640423	−13.7	−11.7
195	2032876	640439	−13.2	−11.2
200	2032881	640454	−13.2	−11.2
205	2032887	640470	−13.5	−11.5
210	2032893	640485	−13.7	−11.7
215	2032899	640500	−14.0	−12.0
220	2032905	640516	−13.9	−11.9
225	2032910	640531	−13.8	−11.8
230	2032916	640547	−13.9	−11.9
235	2032922	640562	−14.1	−12.1
240	2032928	640577	−14.4	−12.4
245	2032934	640593	−14.4	−12.4
250	2032940	640608	−14.3	−12.3
255	2032946	640624	−14.4	−12.4
260	2032951	640638	−14.5	−12.5
265	2032957	640653	−14.7	−12.7
270	2032963	640669	−15.2	−13.2
275	2032969	640684	−15.5	−13.5
280	2032975	640700	−15.9	−13.9
285	2032980	640715	−15.6	−13.6
290	2032986	640730	−15.2	−13.2
295	2032992	640746	−15.5	−13.5
300	2032998	640761	−16.2	−14.2
305	2033004	640777	−17.0	−15.0
310	2033009	640792	−16.8	−14.8
315	2033015	640807	−16.7	−14.7
320	2033021	640823	−16.9	−14.9
325	2033027	640838	−17.2	−15.2
330	2033033	640854	−17.5	−15.5
335	2033038	640868	−17.4	−15.4
340	2033044	640883	−17.3	−15.3
345	2033050	640899	−17.3	−15.3
350	2033056	640914	−17.1	−15.1
355	2033062	640930	−17.2	−15.2
360	2033068	640945	−17.8	−15.8
365	2033074	640961	−18.0	−16.0
370	2033079	640976	−18.1	−16.1
375	2033085	640991	−18.2	−16.2
380	2033091	641007	−18.2	−16.2
385	2033097	641022	−18.4	−16.4
390	2033103	641038	−18.3	−16.3
395	2033108	641053	−18.6	−16.6
400	2033114	641068	−18.9	−16.9
405	2033120	641084	−19.2	−17.2
410	2033126	641098	−19.0	−17.0
415	2033132	641114	−18.5	−16.5
420	2033137	641129	−18.9	−16.9
425	2033143	641144	−19.1	−17.1
430	2033149	641160	−19.5	−17.5
435	2033155	641175	−19.3	−17.3
440	2033161	641191	−19.0	−17.0
445	2033167	641206	−18.9	−16.9
450	2033172	641221	−19.1	−17.1
455	2033178	641237	−19.6	−17.6
460	2033184	641252	−19.6	−17.6
465	2033190	641268	−19.6	−17.6
470	2033196	641283	−19.6	−17.6
475	2033201	641298	−19.9	−17.9
480	2033207	641314	−20.1	−18.1
485	2033213	641328	−20.3	−18.3
490	2033219	641344	−20.6	−18.6
495	2033225	641359	−20.8	−18.8
500	2033230	641374	−20.1	−18.1
505	2033236	641390	−19.7	−17.7
510	2033242	641405	−20.6	−18.6
515	2033248	641421	−20.2	−18.2
520	2033254	641436	−20.3	−18.3
525	2033259	641451	−20.9	−18.9
530	2033266	641467	−21.0	−19.0
535	2033271	641482	−21.1	−19.1
540	2033277	641498	−21.2	−19.2
545	2033283	641513	−21.4	−19.4
550	2033289	641528	−21.4	−19.4
555	2033295	641544	−21.5	−19.5
560	2033300	641558	−21.6	−19.6
565	2033306	641574	−21.6	−19.6
570	2033312	641589	−21.7	−19.7
575	2033318	641604	−21.8	−19.8
580	2033324	641620	−21.9	−19.9
585	2033329	641635	−21.7	−19.7
590	2033335	641651	−21.7	−19.7
595	2033341	641666	−22.2	−20.2

1993 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N4467

June 17, 1993 '
Start/End Time: 0550/0557 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1678.546
Low Water Datum [LWD] Correction feet −2.88

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2032401.400	639751.607	11.539	13.599
	2032402.468	639754.741	9.710	11.770
	2032403.255	639756.006	9.707	11.767
	2032407.415	639769.514	9.606	11.666
	2032410.083	639777.326	8.473	10.533
	2032414.714	639788.125	5.585	7.645
	2032419.127	639799.409	4.061	6.121
	2032424.729	639815.838	2.917	4.977
	2032431.113	639831.212	2.065	4.125
	2032432.857	639834.798	2.209	4.269
	2032435.109	639839.964	0.875	2.935
	2032439.110	639851.384	−0.709	1.351
	2032442.530	639859.700	−1.892	0.168
	2032446.510	639871.394	−2.518	−0.458
	2032448.168	639878.592	−2.913	−0.853
	2032449.317	639882.370	1.612	3.672
	2032450.828	639888.813	2.432	4.492
	2032452.876	639895.920	4.198	6.258
	2032453.280	639901.677	3.209	5.269
	2032453.796	639908.288	−1.405	0.655
	2032454.707	639910.809	−2.450	−0.390
Fathometer Data				
50	2032461	639910	−4.2	−2.1
55	2032467	639925	−6.2	−4.1
60	2032472	639940	−7.5	−5.4
65	2032478	639956	−8.1	−6.0
70	2032484	639971	−8.8	−6.7
75	2032490	639987	−9.2	−7.1
80	2032496	640002	−9.6	−7.5
85	2032501	640017	−9.9	−7.8
90	2032507	640032	−10.1	−8.0
95	2032513	640047	−10.4	−8.3
100	2032519	640063	−10.5	−8.4
105	2032525	640078	−10.4	−8.3
110	2032530	640093	−10.4	−8.3
115	2032536	640109	−10.5	−8.4
120	2032542	640124	−10.6	−8.5
125	2032548	640140	−10.2	−8.1
130	2032554	640155	−9.9	−7.8
135	2032560	640170	−9.7	−7.6
140	2032566	640186	−9.8	−7.7
145	2032571	640201	−9.8	−7.7
150	2032577	640217	−9.9	−7.8
155	2032583	640232	−10.0	−7.9
160	2032589	640247	−10.0	−7.9
165	2032595	640262	−10.1	−8.0
170	2032600	640277	−10.1	−8.0
175	2032606	640293	−10.1	−8.0
180	2032612	640308	−10.2	−8.1
185	2032618	640324	−10.4	−8.3
190	2032624	640339	−10.5	−8.4
195	2032629	640354	−10.6	−8.5
200	2032635	640370	−10.7	−8.6
205	2032641	640385	−10.9	−8.8
210	2032647	640401	−11.0	−8.9
215	2032653	640416	−11.3	−9.2
220	2032659	640431	−12.7	−10.6
225	2032665	640447	−12.9	−10.8
230	2032670	640462	−13.2	−11.1
235	2032676	640478	−12.9	−10.8
240	2032682	640492	−12.6	−10.5
245	2032688	640507	−12.2	−10.1
250	2032694	640523	−12.3	−10.2
255	2032699	640538	−13.2	−11.1
260	2032705	640554	−13.9	−11.8
265	2032711	640569	−14.2	−12.1
270	2032717	640584	−14.2	−12.1
275	2032723	640600	−14.2	−12.1
280	2032728	640615	−14.3	−12.2
285	2032734	640631	−14.5	−12.4
290	2032740	640646	−14.7	−12.6
295	2032746	640661	−14.9	−12.8
300	2032752	640677	−14.9	−12.8
305	2032757	640692	−15.0	−12.9
310	2032764	640708	−15.2	−13.1
315	2032769	640723	−15.4	−13.3
320	2032775	640737	−15.6	−13.5
325	2032781	640753	−16.1	−14.0
330	2032787	640768	−16.2	−14.1
335	2032793	640784	−16.3	−14.2
340	2032798	640799	−16.7	−14.6
345	2032804	640814	−16.7	−14.6
350	2032810	640830	−16.3	−14.2
355	2032816	640845	−16.4	−14.3
360	2032822	640861	−16.6	−14.5
365	2032827	640876	−16.9	−14.8
370	2032833	640891	−17.2	−15.1
375	2032839	640907	−16.7	−14.6
380	2032845	640922	−16.7	−14.6
385	2032851	640938	−17.8	−15.7
390	2032856	640953	−17.7	−15.6
395	2032862	640967	−17.4	−15.3
400	2032868	640983	−17.6	−15.5
405	2032874	640998	−18.2	−16.1
410	2032880	641014	−17.3	−15.2
415	2032886	641029	−17.2	−15.1
420	2032891	641044	−17.5	−15.4
425	2032897	641060	−18.0	−15.9
430	2032903	641075	−18.5	−16.4
435	2032909	641091	−18.6	−16.5
440	2032915	641106	−18.2	−16.1
445	2032921	641122	−18.3	−16.2
450	2032926	641137	−19.0	−16.9
455	2032932	641152	−19.2	−17.1
460	2032938	641168	−19.2	−17.1
465	2032944	641183	−19.1	−17.0
470	2032950	641198	−19.0	−16.9
475	2032955	641213	−18.9	−16.8
480	2032961	641228	−18.9	−16.8
485	2032967	641244	−18.8	−16.7
490	2032973	641259	−18.7	−16.6
495	2032979	641275	−18.7	−16.6
500	2032985	641290	−18.9	−16.8
505	2032990	641305	−19.1	−17.0
510	2032996	641321	−19.2	−17.1
515	2033002	641336	−19.4	−17.3
520	2033008	641352	−19.3	−17.2
525	2033014	641367	−19.0	−16.9
530	2033019	641382	−19.2	−17.1
535	2033025	641398	−19.7	−17.6
540	2033031	641413	−20.0	−17.9
545	2033037	641428	−20.0	−17.9
550	2033043	641443	−19.7	−17.6
555	2033048	641458	−19.5	−17.4
560	2033054	641474	−19.4	−17.3
565	2033060	641489	−19.0	−16.9
570	2033066	641505	−19.0	−16.9
575	2033072	641520	−19.4	−17.3
580	2033077	641535	−20.1	−18.0
585	2033084	641551	−20.5	−18.4
590	2033089	641566	−20.7	−18.6
595	2033095	641582	−20.8	−18.7
600	2033101	641597	−20.9	−18.8
605	2033107	641612	−21.1	−19.0
610	2033113	641628	−20.9	−18.8
615	2033118	641643	−21.4	−19.3
620	2033124	641658	−21.7	−19.6
625	2033130	641673	−21.9	−19.8
630	2033136	641688	−22.0	−19.9
635	2033142	641704	−22.2	−20.1